The MONTHLY REVIEW

Published Monthly by the

American Electroplaters Society

JAN 19 1934

A SOCIETY FOR THE ADVANCEMENT

OF THE

SCIENCE OF ELECTROPLATING

OCTOBER-NOVEMBER, 1930

Entered as second class matter, September 3, 1924, at the Post Office of Chicago, Ill., under act of August 24, 1912 and at the Post Office at Springfield, Mass., September 8, 1930.

Acceptance for mailing at special rate of postage, provided for in section 1103, Act of February 28, 1925, authorized September 3, 1930.

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Published by the
American Electroplaters Society
Publication and Editorial Office
90 Maynard St., Springfield, Mass.

VOL. XVII OCTOBER-NOVEMBER, 1930 No. 10

EDITORIAL

IMPORTANT ANNOUNCEMENT

That the REVIEW may reach its readers the first week of every month the October and November issues are combined herewith.

A change has also been made to a more substantial cover.

We trust these innovations will meet with the approval of our membership.

W. J. R. KENNEDY, *Editor.*

"A CLASS IN EVERY BRANCH"

The October issue of the REVIEW is devoted primarily to the subject of Platers' Classes, using as a slogan "A Class in Every Branch," as suggested by Dr. Blum's recent letter on the "Education of Electroplaters" which was published in the August issue of this magazine. It seems fitting that we should deviate from our formal procedure this month, as we are led to believe that a number of branches are taking the platers' class idea seriously, and a great amount of activity along this line is being manifested as the fall and winter programs are being prepared. The Round Table discussion is therefore being presented to every member in its entirety, first of all as a tribute to those members who by perseverance and foresight placed the A.E.S. on a higher level by successfully demonstrating the practical value of organized classes as an aid to the electroplater; and secondly as an encouragement to members of other branches, who seeing the possibility connected therewith, are anxious to fall in line that they too may receive the same educational benefits along electro-chemical lines without which the foreman plater is handicapped and with which he will be a better foreman and a better plater.

In studying the discussions, it will be seen that some branches were successful almost from the start, while others fell by the way-

side. In analyzing the causes of the latter we find that a lack of sympathy, misdirected energy, and incompetent instructors may have been the straw that broke the camel's back. Here is where the Bureau of Education comes to the rescue and by advice born of experience can direct many branches contemplating the organizing of platers' classes to escape the pitfalls and discouragement always confronting the pioneers in every new endeavor. The Bureau can also give added impetus to such branches by setting in motion the machinery of the Supreme Society which is a very potent factor to be considered when other means seem faulty and unavailing.

Schools and colleges have shown deep interest in this subject and have thrown open the doors of their chemical laboratories to the members of the A.E.S., and capable class leaders can be found in a great many of our manufacturing plants and supply houses.

Opportunity is knocking at our door. Let's make the slogan a reality, "A Class in Every Branch" before the end of the year.

TUESDAY, JULY 1, 1930

Evening Session—Washington Convention

CHAIRMAN WM. J. R. KENNEDY: Before Mr. Sizelove starts the evening session, I am going to ask Dr. Blum to explain to us just the meaning of the round table discussion.

DR. WM. BLUM: The title of your Society says, "A society for the advancement of the science of electroplating." And certainly in accomplishing that purpose, education is the most important thing. The fact that you are here, that you have come to these educational sessions morning and night, shows that you are interested in getting knowledge on electroplating. In addition to that, we know that there are many classes in different branches that are being conducted for platers, and on the other hand I think we can say in all fairness that there ought to be a class in every branch of the Society. If the branch is alive enough to be a branch, to have officers and to have meetings, there ought to be some systematic education, however it is carried on, so that each year the platers will advance further with their technical knowledge.

Now there have been several splendid examples of these classes conducted in the different branches, and they are conducted in as many different ways as there are classes, which is a very good thing, because each branch is then carrying out its own ideas. But it is always a good thing to get together and compare notes,

because I know from experience in the last two years with the class of the Baltimore-Washington Branch that there are lots of things we would like to know about how the other branches do it. Others, perhaps, that have had classes for a longer period.

So tonight we want this to be a discussion of the best way of conducting classes. In order to lay a foundation for that, we are going to call rapidly on these several people who are listed, just for brief remarks to tell what has been done, just so that you will know about what the status of things is, and then we will throw it open for discussion on the various questions that arise in connection with plating.

With that introduction, I think we can call on Mr. Sizelove to tell about the Newark Branch, and that is very appropriate, because we know that Mr. Sizelove has been among the most active men in the Society in conducting this work for the platers.

MR. OLIVER SIZELOVE: Dr. Blum has already told you that Newark Branch was one of the first branches to provide means whereby the members of the branch could learn enough about chemistry to handle their solutions by chemical control, and I just jotted down a few notes on the way that class was organized to receive these instructions.

The Newark Branch Class was started in the fall of 1916. At that time very little was known about the chemistry of plating, that is, the chemistry of plating for platers. Very few, if any, electroplaters had knowledge enough to control their solutions by analysis. Probably the research men had, but that wasn't brought to the attention of the men that were working at the factory and controlling or trying to control their solutions by analysis. This class, when it was started, consisted of twenty-five members. We had our own laboratory, fully equipped, and one night a week was set apart for these classes, two hours a night instruction, for a period of six months. Elementary chemistry was taught, that is, the first principles of chemistry, with a very few experiments, probably some just to determine a chloride test or sulphate test, which were very simple, not to make it any harder to understand than was necessary, because we realized right from the start that the plater thought that chemistry was something beyond his powers to master or control.

The first year the attendance at the beginning was good, but it gradually dropped off until at the end of the term, which was a

period of six months, there were only about four of the members left that had registered at the beginning of that class.

The second year, in 1917, about the same number of members were registered for that class. The same nights, one night a week, and two hours a night, prevailed at that time. The principles of qualitative chemistry were given at that time. There was somewhat more interest in it the second year than the first. Not enough to warrant, I might say, the continuation of that class. The members didn't take enough interest to provide means to support our laboratory. So in 1918 and 1919 the laboratory was given up. I might say that all expenses attached to the laboratory at that time were simply the amount of rent we paid for our meeting place, which consisted of $25.00 a month.

We had several members in Newark Branch that were interested in the education of the plater, and we realized that it was necessary to make the instructions as simple as possible to give the plater just that amount of chemistry that was necessary for the control of his solutions. So three or four of us got together and devised a set of analyses which consisted of, you might say, taking one step after the other, following them along in rotation, and telling them just what to do. In other words, we gave the plater a set of instructions and his tools, and told him to go to work. The interest that was taken was manifest from the start, and out of a class of about 33 that registered, the attendance was well over 80%, and from that time on very little trouble was had to get the platers to take enough interest in it to extend their class and make a success of it. We had interested the vocational school authorities in our work, and they gave us a fully equipped laboratory to do our work with the use of all chemicals and glassware, without a cent of expense. Our registration fee there was $1.00 for a period of six months, which consisted of two nights a week, two hours a night. They even paid the salary of the instructor for us.

If those means are followed with other classes that are started, it will be the best for all concerned. I think that the instructor of that class should be someone that understands chemistry thoroughly, and he should also have some knowledge of plating.

CHAIRMAN KENNEDY: We will probably want to ask Mr. Sizelove some questions afterward when we come to discussing the different points, but perhaps we can get the background better by just having each of these people speak in order. I will ask Dr.

Graham now if he will tell us about the Philadelphia Branch.

DR. A. K. GRAHAM: I am going to ask Mr. Hirsch if he won't tell you what the beginners' class or elementary class have been doing in the last year in Philadelphia. He has charge of that work.

MR. ALBERT HIRSCH: From December, 1929, to April 2, 1930, the elementary class was taught to analyze a nickel solution, cyanide copper and acid copper solution. They were also taught to make the standard solutions and obtain the factor. Blum's and Hogaboom's book was used as a text.

Method employed: A set of standard solution, including a sample of a plating bath, was prepared by the instructor. The factor was reasoned out to multiply the burette reading by, to obtain the answer direct in oz./gal. Thus it was only necessary for the members of the class to understand simple multiplication. Instructions were prepared in detail and printed by the school. One night was devoted to the titration of the metallic nickel content, another night to the titration for chlorine. A third night was devoted to the colorimetric method of determining pH. The next night was set aside for the members to analyze their own plating bath and discussion. The cyanide copper and acid copper were handled in the same manner. Six nights at the end of the term were devoted to the preparation of standard solutions, which the members took to their shops for use during vacation.

School year: The school year was divided into two terms of thirteen weeks each. The elementary class had twelve members, who met one night a week for a two hour period. They are required to deposit a dollar with the Board of Education, which is returned to them if they attend two-thirds of the nights. The supplies and equipment are furnished by the Board of Education; also the teacher's salary.

This course was patterned after the one given by Dr. A. K. Graham at the University of Pennsylvania.

DR. A. K. GRAHAM: In Philadelphia, about 1923, in the spring, Mr. George Gehling asked me if I would do something towards organizing a class in chemistry for the Philadelphia Branch. I was very ambitious in my desire to teach the platers of Philadelphia Branch chemistry. For two years we conducted a course there consisting of nothing more than one night a month, and attempted to cover in that time some of the fundamental elements of chemistry and an introduction to volumetric analysis. That work on my part

was discontinued due to illness, and Willard Scott, of the Philadelphia Branch, continued it for a number of years, to the time of his death last fall.

In the interim, I had the opportunity of visiting the Newark class, and was very much impressed with the methods which Mr. Sizelove was using there, particularly the effort made to reduce the methods of analysis to a definite procedure where you followed directions, one step after another. And it was as the result of the work that Mr. Sizelove carried on that a modification of his method was attempted while with the Hanson Van Winkle Munning Co. The modification consisted in eliminating the instructor in how to prepare your standard solutions, and that was done for no other reason than to enable the plater to control his solutions chemically by learning how to actually operate the details of the analysis as described in this booklet which you have been given, without in any way being obliged to know the fundamental chemistry which would be required to prepare your own standard for analysis. That method seemed to work so successfully that it was worked this winter in conjunction with a course for an advanced group of the Philadelphia platers who came out to the University and asked that we give them instruction in a number of plating solutions.

Now the mechanical method of analysis, as I have described it, consists of just following through step by step, filling the burette, adding your various reagents, and running your titration to an end point, taking the reading at the burette, multiplying by a factor furnished on the standard solution bottle, and getting the answer directly in ounces per gallon. It eliminates all mathematics, nothing more than a multiplication. The advantages claimed for such a method are that in the first place the plater can learn very quickly how to analyze his solution and enjoy the benefits of control in his plating department, and if his interest is sincere enough, he is not handicapped in later taking up chemistry courses which will give him the fundamental background so he ultimately can prepare his own standard solutions and in no way be dependent on others for them. At the same time he isn't obliged to go through the lengthy procedure which we found was so difficult in the early days in Philadelphia of trying to learn a lot of chemistry before he saw its application and frequently tiring of the chemistry in which in some cases was a little difficult for him to understand because he didn't realize the possibilities in its use.

Now the course in Philadelphia this winter for the advanced group consisted in three hour periods, one night a week, for fifteen weeks. During that time we covered the complete analysis of nickel, black nickel, acid and cyanide copper, acid and cyanide zinc, brass, silver, tin and cadmium. In addition to which we had several nights devoted entirely to lectures on electro-chemistry, which was by request of the members attending that class.

Now understand, that group of platers had been attending classes in Philadelphia. I think every member had been attending the classes there for some four or five years, and they had a background to start with. The course that they requested was also conducted in this way: We insisted that for each two men in the course that they buy the necessary chemical apparatus to enable them to perform these analyses. That meant an expenditure of about $22.00, or $11.00 per man, somewhere close to that, and in addition to that, the individual expense was about $13.00 or $14.00, which covered the cost of instruction and of preparing all the standard solutions which had to be made up and used in the class for the analyses given. I would say, therefore, that the cost per plater for the course was $25.00. In some cases, the companies gave the platers the money for that course. At the end of the course, the apparatus was taken by individual members of the class, and those who wanted sets for themselves only had to pay an additional $11.00 to own a complete set of apparatus with which they could perform these analyses in their own plants.

Having had the experience of going through various methods of teaching to put over a course for the platers, I am frank to confess that I am sold on the desirability of teaching nothing more than the mechanics so that the plater can immediately enjoy the benefits of those methods of control in his plating shop, and then later giving him the opportunity of learning what chemistry he has the desire to learn if he wants to go further. I heartily agree with Dr. Blum's statement that there is no reason why every branch of the Society cannot have such a class, and it would be very desirable if they did.

With the methods such as you have described in this booklet (showing copy of "Simple Methods of Analyzing Plating Solutions"), anybody acquainted with the chemical methods of analysis, any graduate of any university, a chemist, would be competent to teach a group of a few platers the procedure as outlined in this little booklet, or by any method of a similar nature. It wouldn't be

necessary for him to know plating. He wouldn't be obliged to tell you how to run your solutions; he is telling you how you can analyze for the constituents in them.

Just to illustrate how that has worked out, one member of the advanced class in Philadelphia belongs to the Electrotypers' Association, and shortly after he had taken the first three lessons he asked for additional sheets of instructions. When I found out how many he wanted, I told him I was sorry I couldn't supply them; but he had them mimeographed at a nominal cost, and he gave the course over again to some sixty associates of the Electrotypers' Association, and they covered acid copper and nickel solutions. It shows how simply a man can give that instruction, or how simple it is to do.

DR. BLUM: I was especially glad, in making up the plans for this meeting, to learn that the Chicago Branch, which had had a class in former years, and then discontinued it perhaps for a short time, had again renewed their activities this year so we were especially glad to get Mr. Faint to come out and tell us about their work.

MR. FAINT: At the February, 1930, meeting of Chicago Branch, a committee of five members was appointed to investigate the best way to hold a class in "The Analysis of Plating Solutions" and report its findings at the March meeting. The report led to the immediate establishment of such a class which in two months covered the analysis of the following solutions for specific constituents as indicated:

Acid Copper Bath	Free Sulphuric Acid
	Copper Sulphate
Copper Cyanide Bath	"Free" Cyanide
	Copper Cyanide
	Sodium Cyanide
Brass Bath	"Free" Cyanide
	Sodium Carbonate
	Zinc Cyanide
	Copper Cyanide
Nickel Bath	Nickel content as metal
	Acidity or alkalinity to methyl red
	Chloride content
Chromium Bath	Chromic Acid
	Sulphuric Acid

Additional instruction sheets were given for both acid and alkaline zinc baths, cadmium baths, and silver baths.

At our May meeting we held a pleasant graduation exercise to award certificates to the 43 men who earnestly struggled through the complexities of chemical analyses, that they might be able to control their plating baths in a scientific way and eliminate the guesswork that occurs when even long experience finds trouble not just like anything previously met and conquered.

And now to follow specifically the outline suggested by Dr. Blum for a basis of comparison of work done in various branches, the report will show as follows:

1. "Number of classes per season"
   One—in Analysis of Plating Solutions. Possibly two next year.
2. "The frequency of meetings."
   Two evenings a week, from 7 to 9, for 8 weeks.
3. "Fees charged for instruction and equipment."
   Sufficient to defray such expenses of the class as were necessary, by assessment.

The expenses of the class amounted net to about $10.00 a man. We held our classes in the Crane Evening High School, in the laboratory which was used in the daytime by the advanced students in quantitative analysis in Crane Junior College. So we had the advantage of a well equipped quantitative analysis laboratory in which all 43 men were easily accommodated. So the advantages of a good laboratory were ours, and owing to the fact that I was able to qualify as an evening school teacher, I was recognized on the same status as any other teacher in the school, and given the freedom of the school under the direction of the Board of Education.

One difference between this and the other classes that were reported tonight is that in Chicago they soak you $5.00 registration fee, and if it is a course in a laboratory they don't give it back to you when the course is over.

4. "The subjects covered in the courses."
   Only one this season, The Analysis of Plating Solutions.
5. "The method of instruction."
   Laboratory work based on mimeographed instruction sheets, supplemented by constant supervision of instructors.

I might state here not only was I helping out with the class, but we had two of the other members of the branch that likewise were

exposed to chemistry for four years, and it took more or less, and they circulated around the class with me and rendered valuable assistance. Another phase of it that might be interesting to you is that every member of the class knew all three of us who were instructing and called us by our first names and in no way were they embarrassed if they seemed to have some question to ask that they thought might be a dumb one. They had no hesitation because they knew us and didn't care whether we thought they were dumb or not, so they were able to get everything they wanted to get that we knew and could tell them.

6. "The attendance and interest of the platers."
Class of 43 platers, ages 28 to 61 years averaging 43 years, with an average attendance of 40 men.

It is the writer's belief that success in classes requires certain definite procedure.

1. Actual laboratory work by every man or not over 3 men to a unit.
2. Not to exceed 2 evenings a week during cool weather.
3. Short 6 to 10 week courses, covering definite topics with practical applications.

If any attempt is made to cover the field of electro-chemistry, the writer believes trouble is ahead—for many of our best platers lack the background of education necessary to a course highly theoretical, and do not have the time nor energy after a hard day's work to undertake the task of mastering a highbrow, high pressure, highly theoretical course which is necessary to a full "chemical understanding" of a practical production process.

DR. WM. BLUM: I happen to be next on the list, with the Baltimore-Washington Branch. Of course, I have been very much interested in teaching education of the platers. On the other hand, until this class was organized two years ago, I had no first hand experience, and I am ready to say right here that a great many of my ideas have changed as a result of the practical experience of the last two years. I hope that the members of the branch itself did not suffer too much from my practising on them.

Now I still feel in principle that a lot of things ought to precede the actual instruction in the analysis of solutions. I say "in principle"; but in practice I am thoroughly converted to the fact that the best way to learn to do is by doing, and therefore in this two

year period we have attempted to get and give as much practical experience as possible. In certain respects, the Baltimore-Washington Branch is fortunate, I believe; in other respects they are somewhat handicapped. The two cities are something over forty miles apart, especially for those who live in the suburbs of the cities, and when the classes were held in Washington, it meant that the members who came from Baltimore had a trip there, usually in a car, of fifty miles, which on a cold winter night meant that some of them would get home at half past twelve or one o'clock. Now under those conditions you can see we were not in a position to have meetings twice a week, as has been discussed in connection with the Chicago Branch. As a matter of fact, the only scheme that was practicable, at least appeared practicable, was to hold one class a month, and that was at the Bureau of Standards in the laboratory, and to devote that full time to the actual laboratory experiments without taking any time for explanation or discussion, and then at the other meeting, which was held in Baltimore each month, to take at least a half of that meeting in a discussion in what they had done in the class, and the results that they had obtained. So that you may say that they had two lessons a month, although only one of those periods was devoted to actual laboratory work.

We were fortunate in this way, that the authorities at the Bureau very generously gave the permission to use the facilities, equipment, chemicals, and so forth. There was never any question raised about those, and any experiments that might involve a considerable amount of equipment, we were fortunate in having a reasonable stock so that the general scheme was to divide the class into six groups. And since there were from eighteen to twenty-four out each evening, that meant that each group had no more than four students. And again we were very fortunate in that the members of my section, several of whom are here this evening, were also willing to devote their time so we had usually six instructors each evening. In other words, we had high pressure salesmanship, and crowded literally as much as we could into each evening. That has advantages; it has disadvantages. Frankly, in the time available the men were not able to get as much first hand experience, actual work for themselves as would be desirable in order to perfect them in actual practice, but at the same time they did get a considerable variety and a great deal of assistance.

The subjects that were taken up the first year: We took up nickel

deposition, but attempted to cover something more than simply the analysis of solutions. In other words, we used nickel plating to illustrate the principles of cathode efficiency, of throwing power, and methods of analysis, and simple elementary principles of chemistry, using nickel, so to speak, to illustrate the principles rather than for the purpose of simply learning to analyze nickel solutions. But we did get the methods for determining nickel and chloride in the solutions.

And then, the second series, (you see that meant that we only had eight actual laboratory periods each year, one a month)—and the second year we devoted entirely to the study of chromium plating solutions in which again we studied not simply the methods of analysis, the determination of chromic acid and sulphate, but also actually experimented much along the lines Mr. Sizelove did a few years ago, in having them find out which solution gave the best throwing power, and what temperature gave the best results, and what was the effect of current density, and so forth. In other words, we did try to illustrate principles at the same time that we were giving definite instruction or definite directions to carry out certain things.

Now, as I said, my ideas have changed a lot. If the class continues, as I have no doubt that it will, we hope and expect to modify our views and methods, and in that way improve it. Our attendance has been good. I did not bring the exact figures with me, but I would say that of the members of the Platers' Society, that the attendance has been about 75% of those who registered. You notice I said, "of the members of the Platers' Society," because we had a slight exception for which you can readily see the reason, that there were a number of men working in the Government Printing Office and in the Bureau of Engraving and Printing who, while not members of the Platers' Society, and most of them not eligible for membership, wished to attend these classes, and since they were being held in the Government laboratory with no expense, they were of course made heartily welcome, and actually their attendance was perhaps a little less uniform than that of the platers, because they were less directly interested. In other words, they were just working incidentally on things that touched these.

Just to illustrate the way we live and learn, one of the things we didn't realize in the first group of classes, the first year, and then it dawned on me the second year, was that with these mimeographed

instructions we would ask them questions and tell them to do things, and put down the answers, but we didn't put any place for them to put down the answers. In other words, that is all right enough for experienced college students who keep full notebooks, but we found out the second year it was a whole lot better, if we wanted them to put down something, to have a space to put it down. If there was something to be weighed, there was a certain place to put down the weight of the thing. If there was a burette to be measured, there was a certain place to put down the value of that burette reading.

So much for the Baltimore-Washington Branch. Now, as Dr. Strachan is not here, I will read a note from him afterwards, but before doing so I will ask Dr. Pan to tell us about his work in New York City.

DR. L. C. PAN: The purpose of the course at the City College of New York is primarily for the betterment of electroplaters who have already had shop experience, but we also admit beginners who are interested in that profession. The class meets two evenings a week, with one hour lecture and seven hours laboratory work.

Both in the lectures and in the laboratory we emphasize, first of all, fundamental principles of electroplating and principles underlying the various tests which are useful in the control of electroplating baths. In the lectures we also make a critical study of each of the plating processes now in commercial use. The laboratory work is divided into two groups of exercises. The first group of exercises deals with various physical and electro-chemical methods of testing the plating bath; these tests include current density, thickness of deposit, electro potentials, effect of temperature, current efficiency, hydrogen ion concentration, throwing power, effect of addition agents and brighteners, porosity and corrosion tests. The second group consists of chemical analyses of plating solutions. These laboratory exercises are planned to cover the whole field of practical electroplating, arranged not according to the different metals to be plated nor according to the types of plating baths dealt with, but rather according to the fundamental principles upon which all plating problems depend. Each student is required to prepare his own plating baths and reagents from chemicals with the original labels on the bottles. He is not allowed to use any solution or reagent prepared by someone else. In this way we inculcate each student with the habit of getting first hand knowledge. The student

is also required to make his own observations, record them and make reports after the completion of each exercise.

The laboratory at the College of the City of New York is very well equipped, in the following respects: Each student has his own desk and his own individual switchboard, which consists of one voltmeter, one ammeter and one milliammeter, adjustable rheostat, switches and fuses. The electric supply of the laboratory gives any voltage from 0 to 240 volts d. c., and enough amperage to carry on all types of testing and experimental plating work.

Each student has his own gas, water, steam, compressed air and suction lines. There is a fume hood in the laboratory and a variable speed, and polishing lathes in a separate room. It runs at 1000 to 5000 r.p.m. The students are also furnished with all kinds of buffs, wire brushes and buffing compounds.

In analytical work we have a complete line of chemicals and apparatus besides a large supply which is always maintained in the chemistry department of the college.

Detailed directions for the various tests and chemical analyses are given in a laboratory manual specially prepared for the students. A copy of this manual is here in front of me. As you can readily see, the amount of laboratory work as outlined in the manual is more than anyone could cover in 14 weeks' time, which is the usual length of the course. However, we only require each student to do 50% of the work as outlined in this manual. Each student is at liberty to choose the exercises which best fill his needs. We presume that after a person has gone through this course he should be able to do the remainder of the exercises all by himself, either at his home or at his place of work. A number of my students, however, remained in the class for a second term to go over the exercises which they had left out during the first term.

The attendance of the class, both at lectures and in the laboratory, is very good. At the end of the term the number of students who drop out never amounts to more than 15%. We give no diplomas or certificates, and we hold no final examinations, but we do have 15 minute quizzes at the beginning of each lecture, which gives the instructor an idea of how well the students are mastering the principles of electroplating.

We charge each student a tuition fee of $30.00. The actual cost of maintaining this course at the present time is about $50 to $60 per student, the balance being taken care of by the City College.

CHAIRMAN KENNEDY: Dr. Strachan, who, as many of you know, is teaching at Brown University and is very much interested in the Providence Attleboro Branch, sent regrets at the last minute, as he was unable to be here. His paper will be read, however.

"CHEMISTRY FOR ELECTROPLATERS"

By E. K. Strachan

The course in chemistry for electroplaters which has been given in the Extension Department at Brown University during the past five years, owes its origin to the local branch of the American Electro-Platers' Society. Members of the local branch came to the University in search of instruction. As a result, one of the professors who knew nothing of practical electroplating, and a group of thirty electroplaters who knew little or nothing of scientific chemistry, agreed to pool their knowledge, each supplying what the other lacked, and together develop a course of chemical study for electroplaters. The following discussion presents, in a general way, the content of the course and method of instruction.

We met every Monday night for thirty weeks during the fall and winter for the past five years, with an attendance of from twenty to thirty. The classrooms and laboratory are open from half past seven until ten. The time spent in the classroom and laboratory varies with the subject matter and method of presentation. The topics for the various lessons are selected by consultation of the class and professor. In general, the classroom discussions consist of about one-third chemical and electrical theory, about one-third chemical analysis of plating solutions and platers' supplies, the remainder being an application of theory to practical plating and a discussion of operating conditions. The lecture is almost always followed by a general discussion and experience meeting.

The laboratory work is almost entirely chemical analysis.

The nature of the subject matter is best made clear by some examples. I will, therefore, illustrate the sort of things discussed as chemical theory, chemical analysis, and application of theory to practice.

The discussion of chemical theory usually begins with a lecture illustrated by experiments to make clear the meaning of the terms pure substance and mixture; element and compound; atom and molecule; atomic weight and molecular weight; etc. This is fol-

is also required to make his own observations, record them and make reports after the completion of each exercise.

The laboratory at the College of the City of New York is very well equipped, in the following respects: Each student has his own desk and his own individual switchboard, which consists of one voltmeter, one ammeter and one milliammeter, adjustable rheostat, switches and fuses. The electric supply of the laboratory gives any voltage from 0 to 240 volts d. c., and enough amperage to carry on all types of testing and experimental plating work.

Each student has his own gas, water, steam, compressed air and suction lines. There is a fume hood in the laboratory and a variable speed, and polishing lathes in a separate room. It runs at 1000 to 5000 r.p.m. The students are also furnished with all kinds of buffs, wire brushes and buffing compounds.

In analytical work we have a complete line of chemicals and apparatus besides a large supply which is always maintained in the chemistry department of the college.

Detailed directions for the various tests and chemical analyses are given in a laboratory manual specially prepared for the students. A copy of this manual is here in front of me. As you can readily see, the amount of laboratory work as outlined in the manual is more than anyone could cover in 14 weeks' time, which is the usual length of the course. However, we only require each student to do 50% of the work as outlined in this manual. Each student is at liberty to choose the exercises which best fill his needs. We presume that after a person has gone through this course he should be able to do the remainder of the exercises all by himself, either at his home or at his place of work. A number of my students, however, remained in the class for a second term to go over the exercises which they had left out during the first term.

The attendance of the class, both at lectures and in the laboratory, is very good. At the end of the term the number of students who drop out never amounts to more than 15%. We give no diplomas or certificates, and we hold no final examinations, but we do have 15 minute quizzes at the beginning of each lecture, which gives the instructor an idea of how well the students are mastering the principles of electroplating.

We charge each student a tuition fee of $30.00. The actual cost of maintaining this course at the present time is about $50 to $60 per student, the balance being taken care of by the City College.

CHAIRMAN KENNEDY: Dr. Strachan, who, as many of you know, is teaching at Brown University and is very much interested in the Providence Attleboro Branch, sent regrets at the last minute, as he was unable to be here. His paper will be read, however.

"CHEMISTRY FOR ELECTROPLATERS"

By E. K. Strachan

The course in chemistry for electroplaters which has been given in the Extension Department at Brown University during the past five years, owes its origin to the local branch of the American Electro-Platers' Society. Members of the local branch came to the University in search of instruction. As a result, one of the professors who knew nothing of practical electroplating, and a group of thirty electroplaters who knew little or nothing of scientific chemistry, agreed to pool their knowledge, each supplying what the other lacked, and together develop a course of chemical study for electroplaters. The following discussion presents, in a general way, the content of the course and method of instruction.

We met every Monday night for thirty weeks during the fall and winter for the past five years, with an attendance of from twenty to thirty. The classrooms and laboratory are open from half past seven until ten. The time spent in the classroom and laboratory varies with the subject matter and method of presentation. The topics for the various lessons are selected by consultation of the class and professor. In general, the classroom discussions consist of about one-third chemical and electrical theory, about one-third chemical analysis of plating solutions and platers' supplies, the remainder being an application of theory to practical plating and a discussion of operating conditions. The lecture is almost always followed by a general discussion and experience meeting.

The laboratory work is almost entirely chemical analysis.

The nature of the subject matter is best made clear by some examples. I will, therefore, illustrate the sort of things discussed as chemical theory, chemical analysis, and application of theory to practice.

The discussion of chemical theory usually begins with a lecture illustrated by experiments to make clear the meaning of the terms pure substance and mixture; element and compound; atom and molecule; atomic weight and molecular weight; etc. This is fol-

lowed by another lecture discussing chemical formulas, the law of definite proportions and calculation of chemical proportions. To illustrate these methods of calculation we compute the metal content of the common plating salts, silver chloride, silver cyanide, copper sulphate, nickel single salt and double salt and many others. As the students become more proficient we consider problems like the following:

If sal soda costs 1 cent and soda ash costs 1½ cents, which is the cheaper to use as a neutralizing agent or as a washing compound? The answer is, of course, that the active chemical of both these salts is carbonate of soda; and that while soda ash is nearly pure carbonate of soda, sal soda contains only 37% carbonate of soda, the remainder being water of crystallization. Hence carbonate of soda costs 1/0.37=2.7 cents a pound from sal soda and only 1.5 from soda ash, in spite of the higher price per pound of the latter.

Again, another example; suppose silver anodes and silver cyanide are both quoted at the same price per ounce. The purchasing agent of one large concern told me it didn't matter which he bought as both were the same price per ounce. Let us examine the situation. Now silver cyanide is only 4/5 metal, the remainder being cyanide. Hence if both silver cyanide and anodes are quoted at the same price, silver from the cyanide costs 1¼ times as much as from anodes. There is another joker also in the situation. The metal of course is sold by troy weight, while the cyanide is quoted in avoirdupois weight. The troy ounce is 1/10 heavier than an avoirdupois ounce, hence we must use one-tenth more silver cyanide yet to get an ounce of metal, or really it takes 1⅜ avoirdupois ounces of silver cyanide to yield 1 troy ounce of metal. Many similar problems are discussed and solved in our class.

The analytical work is fairly well exemplified by following method for the analysis of silver baths. To the expert chemist this may seem a very crude procedure and one which could not be relied on to give reliable data. The proof of the pudding, however, is the fact that during several years this method has been used in several local plating establishments with satisfactory results. Moreover, the author has checked the values which his students have found in their own factories in their own baths, by analyzing the same solution by the accurate and approved methods of the chemist. The method will show definitely the metal content of the solution within 1/5 ounce per gallon, which is amply accurate for practical pur-

poses. It is essential, however, to follow directions exactly and, above all things, to select medicine droppers that deliver the same sized drops, to hold them always in the same way, and add drops at about the same rate every time.

Determination of Silver in Silver Plating Bath

Apparatus Needed:

1 Quart bottle for standard silver solution.
1 Quart bottle for thiocyanate solution.
3 Medicine droppers.
1 Two oz. bottle for iron solution.
1 Test tube.

Solutions Needed:

1. Standard Silver Solution—Dissolve exactly ½ oz. avoirdupois of pure dry silver nitrate and make up to 1 qt. with distilled water. *Or,* dissolve 4½ dwt. pure dry silver nitrate in distilled water and make up to a pint.

2. Iron Solution—Make a nearly saturated solution of ferric alum. Add strong nitric acid a drop at a time until it becomes very pale yellow.

3. Sodium Thiocyanate—Dissolve 1 oz. NaCNS in about 1 gallon of water. Put 23 drops of standard silver solution in the test tube. Add about ½ oz. of water and two drops of iron solution. Now add thiocyanate solution a drop at a time with shaking until a faint permanent pink color is obtained. If less than 20 drops of thiocyanate are required add water to the thiocyanate, shake and test again. Repeat the testing and diluting until it is found that 23 drops standard silver require exactly 20 drops thiocyanate.

Method of Analysis:

Place 5 drops of silver bath in the test tube and about 20 drops strong sulphuric acid. Heat until all cyanide is expelled and until a clear solution results. If the silver bath was made from silver chloride it may require considerable heating and perhaps the addition of more sulphuric acid to completely decompose the chloride. It is essential that you secure a clear solution. Then evaporate off most of the sulphuric acid. *Cool.* Add about 1 inch of water and 2 drops iron solution. Add thiocyanate solution a drop at a time until a faint permanent pink color is obtained. Each drop of thiocyanate represents 1/5 oz. silver metal to the gallon.

Similar methods have been devised and tested for free cyanide, nickel, copper, chloride and some other substances. More elaborate

methods are used for zinc and cadmium. The sulfate in chromium solutions is determined gravimetrically.

The following are some of the subjects which have been studied:

1. Silver Plating.
2. Nickel Plating.
3. Copper Plating.
4. Zinc Plating.
5. Brass Plating.
6. Cadmium Plating.
7. Chromium Plating.
8. Lead and Tin Plating.
9. Gold Plating.
10. Cleaning and Cleaning Compounds.
11. Lacquers—Manufacture, Composition and Use.
12. Acid dips and pickles.
13. Oxidizing and Coloring.
14. Determination of Silver.
15. Determination of Free Cyanide and Carbonate.
16. Determination of Nickel.
17. pH—Meaning and Measurement.
18. Copper Determination.
19. Zinc Determination.
20. Cadmium Determination.
21. Gravimetric Sulfate in Chromium Solutions.
22. Titration of Acid and Alkali.
23. First Principles of Chemistry.
24. Chemical Calculation (several lessons).
25. Acids, Bases, Salts, Neutralization, and Hydrolysis.
26. Electrolytic Dissociation.
27. Character Metals and Non-metals.
28. First Principles of Electricity (Units of Measurement, Application of Ohm's Law).
29. Measurement of Resistance.
30. Faraday's Law and Current Efficiency.
31. Electrode Potentials, Polarization, Over-voltage.
32. Throwing Power.
33. The Less Common Metals.
34. Testing Plated Articles.

One semester, the entire course consisted of Qualitative Analysis for the metals. The more advanced students who have attended several years did considerable work this year on the qualitative examination of various alloys and finishes which came into their shops.

DR. BLUM: I might explain the other one listed is Dr. Mantell, who also sent regrets at being unable to be here. In abstracting his

paper, I want you to realize that Dr. Mantell presents a different phase of the education of electroplaters. Dr. Mantell is not teaching classes of platers at night; he is teaching in Pratt Institute, which is an institute for instruction in industries in a two year full time college course. In other words, it is an attempt to crowd into two years full time the work which might be taken under other conditions or spread over a four year college course. In other words, it is a course in applied science.

THE TRAINING OF ELECTROPLATING ENGINEERS

By C. L. Mantell

The training at Pratt Institute is given as an option in the course in Industrial Chemical Engineering. This is a two-year intensive engineering course of a novel non-collegiate type, expressly designed to lead directly to a large and attractive field of employment in responsible technical and supervisory positions. It is administered to make possible an adequate and highly effective training within the shortest time consistent with thoroughness.

Actual *doing* is an important characteristic of the instruction, and about one-half the student's time in school, or one-third of the total time including that of required study outside of school hours, is devoted to practice in the school's extensive and well-equipped laboratories, shops, and drawing and design rooms.

The course content includes the following subjects as a basis:

Chemistry: Being subdivided into General Chemistry, 60 hours classroom, 120 hours laboratory; and Analytical Chemistry, including qualitative and quantitative analysis, 60 hours classroom, 214 hours laboratory, which are given in the first year; and Industrial Chemistry, 96 hours in the classroom, 144 hours in the chemical industries laboratory; Organic Chemistry, 48 hours classroom, 48 hours laboratory, being only a brief survey course; Technical Chemistry, 60 hours classroom, 240 hours laboratory, in which the analytical work on commercial practice of various natures is given, as well as the experimental work in physical and electrochemistry, being given in the second year.

Physical Elements of Engineering: Subdivided into Mechanics, 32 hours classroom, 40 hours laboratory; Heat, 32 hours classroom, 40 hours laboratory; and Electricity, 32 hours classroom, 40 hours laboratory, which are given in the first year; Mechanical Technology, 72 hours classroom, 72 hours laboratory, subdivided into

the work of strength of materials, testing laboratory, mechanics and power; and Electrical Technology, 36 hours classroom, 36 hours laboratory, covering d. c. and a. c. theory and machines, both of which are given in the second year.

Mathematics: A total of 168 hours classroom, subdivided into chemical algebra, technical geometry, and technical trigonometry, of which the engineering applications are emphasized, given in the first year; and Technical Analytics, 36 hours classroom, given in the second year.

Mechanical Drawing and Design: Being given as Mechanical Drawing and Descriptive Geometry, 108 hours, in the first year, and Chemical Design, 108 hours, in which the unit processes of chemical engineering and plant design are studied with special emphasis on layout, material handling, and design of electroplating and metal finishing plants, given in the second year.

Shop Work: 108 hours, of which one-third is in the forge and heat treating laboratory, one-third in the pattern shop, and one-third in the foundry of the Institute in the first year; and Machine Shop, 48 hours, being of an advanced nature, given in the second year.

English: 24 hours, with emphasis on technical reports, given in the first year; and Industrial Administration, 36 hours, being a survey course of business and its organization, given in the second year.

The school year is 36 weeks long. Students are in school every day from 9 to 4 o'clock, 5 days a week, being assigned in either a classroom, laboratory, or shop every hour of the day. Outside study is required to the extent of about 50 per cent of the time consumed while in school.

The electroplating option is operated in connection with the unit electroplating plant in the Chemical Industries Laboratory. Here a complete semi-commercial installation is available for instruction purposes, including a 60 ampere motor generator set, one of 600 ampere capacity, the necessary switchboards, large plating tanks, cleaning tanks, rinsing equipment, plating barrels, buffing wheels, driers, and other incidental equipment for pickling, lacquering, and metal finishing.

Work is done over the whole range of metals which are commercially plated, both in an experimental manner and on a semi-commercial scale. The students also become acquainted with test

sets of the plant type and rapid control methods, as well as equipment for determination of the protective value of deposits. The work is laid out so that investigations are made of buffing and polishing methods, compounds and commercial articles, as well as cleaners of the types prepared by the students and those of a commercial nature.

Similar attention is given to plating baths, addition materials, "brighteners," pickle aids, finishing and oxidizing preparations, and the other materials of interest to the electroplating industries. Study of the analytical methods involved, control of solutions, conductivity and pH measurements, development of special analytical methods and unusual small scale plating, is done within the course in technical chemistry.

In the laboratory where the latter work is given, extensive electro-analysis equipment and small power control boards are available. Special study of plating generators and electrical machinery peculiar to the plating industry is given to the electroplaters in the electrical technology course, while as part of their work in the course in chemical design they lay out plating plants and design some of the machinery for automatic plating.

Considerable co-operation, in the shape of gifts of supplies and equipment, has been received from manufacturing organizations, supply houses, and chemical companies. Additions and improvements to the physical plant are being made at frequent intervals. Inspection trips are made periodically to large manufacturing plants operating plating departments, as well as to job plating shops in the New York District.

As text books, those of Blum and Hogaboom and of Langbein are employed, while the Transactions of the American Electrochemical Society are used for reference purposes. During their time as students, the men are encouraged to attend the meetings of the New York Section of the American Electrochemical Society as well as those of the various branches of the American Electroplaters' Society.

It is quite gratifying to note that a large percentage of the men applying for the electroplating option have been employed before coming to school as platers, foreman platers, and in other capacities in plating plants or plating departments of large industrial organizations. For those who have not been so fortunate, efforts are made to place them in such industries during the summer between the

first and second years of their course, so that they may acquire some necessary mechanical skill and become cognizant of conditions in the industries in which they intend to go.

DR. BLUM: So you see, Dr. Mantell is not so much training or educating the platers that are, as the platers that are to be.

Now that covers what might be considered the formal or informal presentation of what is being done. I am going to ask first of all, before asking for any general discussion, whether there are representatives here from other branches that have not been heard from who can take a few minutes' time to tell us about classes that have been conducted by them. Has the St. Louis Branch had any class in recent years, Mr. Musick?

MR. E. J. MUSICK: About fifteen years ago, or the year after Newark Branch had their first class formed, we formed a Saturday afternoon class that met from 1:30 till 4:30 and took a course in elementary chemistry. Unfortunately the professor in the high school there admitted he had never been inside a plating plant, and it seemed as though we never did get him to come into a plating plant, so he really didn't know what it was all about. We had, I would say, fourteen or fifteen members, ranging from possibly 30 years up to one man named Fisher, the size of Mr. Gehling here, and he was 68 years old when this chemistry class was formed, and none of us had any idea he was going, but he came there when we formed the class, and about the third meeting he fell on the ice and broke his collar bone and was missing two meetings, but he came every meeting after that.

We only had about seven or eight absentees during that entire lecture course of about 28 Saturday afternoons. After that, through the able guidance of our good friend, Mr. Williams, we always managed to have a meeting at the beginning of our fall term, and he always outlined, with the aid of whoever the librarian was, the subject to be taken up each meeting, and in order to get something there, we each agreed to do our best on the subject assigned, and we went along that way ten or twelve years. About four years ago, we succeeded in getting Dr. Warren, of Washington University, and he gave us a lecture course for two years, for which we gave him about $50 or thereabouts for his half a dozen or eight lectures, one a month. But two years ago, we were even more fortunate, and got a Dr. Stout, and he is a real, honest to God he-professor, if you know what I mean. He certainly visited shops and he entered into

the spirit just like we do it. He cussed once in a while and told us jokes, but the beauty of it was that he sized up what we were deficient in and what we lacked, and I remember his opening line of thought. On the blackboard he drew two goal posts. He said, "You as electroplaters can go over this far, and I as a representative of the theoretical side can only go this far. Now what we are going to try to do is to narrow that space between where we stand and eventually we will get somewhere near,—we may pass each other."

Well, realizing that other branches were going into this thing from the chemical laboratory end of it, and realizing they were actually doing analysis, we made up our minds at our final meeting just this past month, and we decided to go into the laboratory end of it at Washington University next year, and Dr. Stout is going to teach there, and I think it is going to cost us something like $50.00 apiece to go into this class and actually accomplish something. But Dr. Stout has in the past two years found out exactly what is necessary, and I think he is going to go along the line as suggested. I haven't looked at this booklet yet, that Dr. Graham has suggested; but I am going to get one of these booklets and mail it to him. I think that is what we want, and I think that is what we are going to do, but we haven't done anything in the chemistry line, actual laboratory work, for any time at all, outside of our elementary course.

DR. BLUM: How about Rochester Branch?

MR. S. P. GARTLAND: I might say Rochester in the past has made two attempts. At one time we were going out at Lavarre, and one of the chemists of Bausch & Lomb, Mr. Kolb, instructed us in the fundamentals of chemistry. Another time, we had a group attending the evening classes, the shop school. About a month ago, we organized a class. We expect to start around the first of September, and we expect, from the enthusiasm that was shown by the younger members, as well as the older members, that it is going to be put across with success.

MR. JOHN FEELEY: I might say for Montreal Branch, you know we started some twenty years ago; we had our professor get in touch with Dr. Blum, and at that time Dr. Blum had those ideas that he speaks about, that he hasn't got now, and our professor tried to get along with Dr. Blum's ideas, but didn't get along with ours, so after attending his school for some time, he was just about as far away as we were, so we gave that up. We tried it again.

About last September, I was fortunate enough to get Dr. Milton Hersey and Dr. Job of a company in Montreal to get hold of a student, who is now in his fourth year medical, but who has been a couple of years in the laboratory with them, and I had him come to my shop a couple of nights a week, and had three of the younger members take the elementary chemistry, and they are now in a position to make their standard solutions and do their titration and analytical work, and they have impressed upon the older members and in fact all members of Montreal Branch who didn't think it was possible to do anything, that they are now answering the questions for the older members, and in the last couple of months we have had a meeting every second week, and have had ten or eleven members turning out (our total membership is 20, three or four of whom live out of town), and I feel sure, in fact they have agreed, that there is to be no cancellation of classes or discussions during the summer. They are going to go right straight through, one night a month instead of two. And, as I have already said, they are so enthusiastic over the work they have decided the Research Committee fund needs the money and they will pay 50c a month to help the Research Fund that they might advance further along the line of education.

MR. DAN WITTIG: About fourteen years ago, we organized our first class. That class should get a Carnegie Medal,—every man who attended. One of the members had a laboratory in his basement. He had no furnace in the basement, there was no heat in the basement. We sat in a little bit of a coop, and all the apparatus and stuff was on the table. We had some chairs and some boxes to sit on. We would bring down a lot of newspapers and sit on the backs of chairs. There was no heat in the place at all, but we would have to open the window or we would have suffocated. We went along without any definite program. We didn't know what we were to do. We got quite a lot of information. That class attended regularly. Why the member's wife didn't throw us out, I don't know. We had to come in through the front door of the house and we would all sit around the dining room and smoke and carry in the snow and everything, and mussing up the place. We sat there all winter. We had some good men in that class, like Joe Bierbaum, and some other fellows. Well, we learned something. We all learned something. I was one of the oldest. Well, if the instructor would ask me

and I didn't understand it, I would say, "I'm too old; I can't learn nothing." But some of the boys learned quite a bit.

Well, after that winter was over, about two years after, we organized another class. We went to the vocational school, that is, a city school. We could go to the laboratory in the evening. But it was not confined to the members alone, because it was in a public school, and we had to take everybody that came in. So we issued a call, we sent to every factory having electroplaters, sent them a notice to send their plater or whoever they wanted to send, to this meeting, and we organized a class. We had a registration fee of $1.00. This class was organized, and because there was nothing definite, we could not do as we wanted to. Of course we had to take everybody that came. They averaged in age from 16 years to 60. Our instructor knew nothing about plating. It was the same instructor we had with the first class with the heroes. He knew nothing about plating, and he simply asked us what we wanted to learn. Well, it wasn't a bad idea,—he didn't know, and we didn't know how to lay out a course or anything else, and we went ahead. We started in that class with over 30. One night a week we sat in the school room, and he would lecture to us and we would write down. We learned the elements and valents and all those sorts of things, and the next night we would go in the laboratory. We had groups of three and four. We sat in this classroom where they had the lectures, and you can imagine some of these fat fellows sitting at these little desks the boys sit in in the daytime.

We did pretty well. They had a good laboratory there, but they didn't have any supplies. That is, they had some, and we would go around and help ourselves the best we could. That class kept on getting smaller and smaller. We had to have a roll call every night because we had to report to the school. We would fake that roll call. Of course they would answer, "Oh, he intended to come." We had to have an average, I believe it was of sixteen, to continue. If we didn't have that many there, we would get thrown out. So we always had sixteen there, even though there might only have been seven or eight.

The boys learned quite a bit, but as we had no definite program, it started getting smaller and smaller. Joe Bierbaum was there, a very able man, and Pat Sheehan, and we attended the class and got along pretty well. I used to go home with the instructor; once in a while we would go and get a glass of beer. He would ask me, "Dan,

did you get that?" I always said yes. There were a lot of young fellows there, and they said "Yes," too, but they didn't get it any more than I did. I didn't know a thing about it.

So I told the instructor, "There is only one thing I want to learn, and that is to test a silver solution for free cyanide."

When I would go home with him sometimes, some of these things he had said maybe a month before would start filtering through my head and I would tell him about it, and he would say, "Dan, you know more than the young fellows."

We ran through that season. It was pretty fair, we all learned something, but, as I say, we had no definite program.

About three years after that, we organized another class, also in the vocational training school. We paid our $1.00 fee, and we got into a laboratory that was used by young students during the daytime. When we would get there at night they would have everything put away in lockers, so we couldn't get at anything at all. There wasn't even any distilled water there, and if we needed any we had to buy it, and when we came around again the next week, that would be gone and we would have to buy more. That class kept on going down, down, down. Of course we had no fixed program, but they all learned something. Even I learned something. Most of the time we had no glassware, or anything, we couldn't get anything. Then I was made instructor. On one side of the room was six or eight of these fellows, and I was just telling them about valents and atomic weight and that stuff, and we would figure it out and so on, go to the blackboard, and of course if I made a mistake the instructor was there and he would say, "Here, you made a bull." So here you see the instructor, who didn't know a thing about it.

In the first "hero" class, we paid the instructor, each individual member paid so much per night. And in the second class, we paid the instructor because the school would not pay him. We had to collect money to pay him. In the third class, where I was one of the instructors, the same old instructor we had was selling plating supplies and he would come for nothing. So we had no definite program, and that class went down from 30 to about 6.

A little over a year ago, we had a very good man, a chemist, whom we call the pinch hitter in the Milwaukee Branch. He is a good chemist. He wanted to organize a little class so we could learn a couple things. We put in $75 apiece. There were four of us. Roy Hunt sits over there and we had Bob Steurnagle and his son. Here

were two old fellows and two kids. Well I said, "If I don't do anything else, I won't have to spend any money." I went there one night a week, and learned a little something but not much.

So here you see a man that didn't learn anything and still was an instructor. As I say, you must have a definite program, no highbrow stuff. I don't want to say it should be as simple as the dropper method, but you have to have methods that anybody can understand. I believe as was outlined, I believe by Mr. Sizelove or Dr. Graham, you have got to have a definite program if you are going to do anything.

So I learned something, and we all learned something, and there is a chance for them to start again, but we've got an awful hard time getting the young fellows to do anything.

DR. BLUM: Now this is a good experience meeting. What other branches have or have had classes in plating?

MR. WALTER FRAINE: Some years ago, the Dayton Branch organized a class. They went down to the vocational school, under the usual procedure there, paying $1.00 for registration, and if they had a certain attendance record the dollar was returned at the end of the period.

That didn't amount to anything, simply because, as has been stated here, there was apparently no relation between what they wanted to teach and what they wanted to learn. So consequently, that didn't pan out very well. Later on, Mr. Suman ran another class, where he had, I think, about twenty of the men who went into it. For three years they met, I think one night a week, all through the winter, and devoted their time to learning how to analyze their solutions, and that work was confined almost entirely to the analysis of solutions. As a result, quite a few of the men received considerable advantages from it. But that class has been discontinued now for the past two years, and there doesn't appear to be very much interest among the members of the Dayton Branch toward organizing another one, but they have had classes and done some work.

MR. GEORGE GEHLING: Well, it has turned into telling a history of what has happened without definite plans. I want to give you a little history of Philadelphia Branch. We started off without definite plans, but I am very proud to say that in Philadelphia Branch, whether we started off without definite plans or any other way, we have stuck to it until we did get definite plans.

Some six or seven years ago, or a little more, when this talk was going around, and before I came to Philadelphia Branch, I had a little experience in Newark Branch with a laboratory, the branch trying to run a laboratory so they could educate the plater in learning how to plate and analyze solutions and work them out, and found that the laboratory plan wasn't a very good one in Newark; it didn't seem to hold up right. But the boys in Philadelphia wanted a laboratory. And being president of the branch I couldn't see spending any money. I knew it couldn't be kept up if there was no definite plan attached, so I never was in favor of starting anything without the definite plan, so the laboratory was forgotten. But we wanted to learn something, so the first thing we thought we would do, we would start a series of lectures through the winter, and we got our friends—we were fortunate in the city of Philadelphia that we had some good friends who could tell us something. We got our friend, Doc Graham there, and he came there and gave us a series of ten lectures which were very good and instructive, and after the ten lectures were over that winter, in asking questions from the President's chair of the different ones, I found that the ten lectures as far as education was concerned had gone over all our heads, that we were in Dan Wittig's class. We could talk those lectures, but it didn't mean anything. It wasn't the instructor's fault, not at all; he tried to do everything to make us understand and comprehend. He showed us what the valents and different things meant, and atomic weights, and we copied them down and everything, but when we went out of there by the time the next meeting night came around we had forgotten all about them and we would keep right on going. So we found out that wasn't a good plan.

But we wanted to have a class, so we decided to appoint an Education Committee to go around and get hold of the Board of Education and see what we could do. We had no vocational school in Philadelphia, but we had the high schools which were running evening classes. We knew Newark had done the same thing, and I had a little experience there, so I had the advantage of some of you other fellows who didn't have a chance to lay out a definite plan, but I laid out a definite plan of what we wanted.

The first thing we did was to try and not make the same mistake that we knew other people were making, so that the class would dwindle down from 20 or 30 to nothing. That is a mistake

you have got to be careful of, and that is the instructive part that counts in the end, for this reason. Dan Wittig stated and a lot of other people will state that if you go to the public school, it will be necessary to take in everybody in the public in that class. We were going to be our own Board of Education. If we were going to have something we were going to have it the way we wanted it and still comply with and be within the law. Of course a public school is for the public, but the Board of Education does not want to spend any of the public's money wastefully. How are you going to waste it? If the class is going to dwindle to nothing, that money is wasted. So we had a plan, we had a definite plan, that they wouldn't waste that money, and we made it in this way: We took the plater's application blank and said, "We are going to run two classes in this course. We are going to run an elementary class and we are going to run a class that we will call the advanced class,—the advanced electroplating class." In other words, that was a class who had some elementary knowledge of the chemistry of plating, and that class, their rating was to be that they would have to be platers five years, and foremen one year, before they were eligible to the class in the vocational school. Now that was a law we laid down. That was all we required for membership in our Society. That goes out to the public, and that is the law, and you can imagine any fellow we get in that class under such a classification, how long he is going to be out of the Philadelphia Branch before we have got him in there. We never had one in that class yet that we didn't cop.

The elementary class was for the fellows who had no knowledge of chemistry, and in fact there is no branch in the country, in my opinion, that all their members have had a chance to study some of the elementary chemistry they should have learned. So the elementary class was composed of people who were working in a plating room, and they had to be working in a plating room. A man could be the foreman or he could be the helper.

Now the Board of Education took that this way. We had to explain it to them, we had to give them a definite plan. The reason for that was this, and we proved it and demonstrated it to them. That when a school system opened and was advertised on the literature of the public schools, that they had all these classes in the evening schools, that pupils could be enrolled in them, there are a lot of people who might hear something about electroplating, but don't know anything about it, never saw the thing, with the excep-

tion they saw it on an automobile that was chromium plated, and they think, "Well, that is a nice vocation, that is a job; I am going to the school and learn electroplating." That fellow gets a disappointment, because we weren't teaching that, we were teaching the chemistry of electroplating, and after being there three, four or five nights, he had only put up a dollar, and he would drop out. The instructor was being paid by the Board of Education, and that money would be wasted, and that is what the Board of Education didn't want. So we proved to them, and insisted that the only way they wouldn't waste the instructor's money was to take the people who were interested in plating; the pupils must be interested in plating, and to be interested in plating they had to be working at plating. So we overcame that, we put that in the Board of Education, they took it and put it down, and we have our classes, and our classes held good and still hold good.

Those are the mistakes you have to be careful of, that you get people that are interested. We had lots of trouble getting started, but once we got started we were able to improve. We have improved to the extent we got out of the school some of our men who had put in three or four years in the school and advanced them. We give them a college course now; we have a college course in the city of Philadelphia where you can go there and get some of it. And one of our men that spoke here tonight has gone through that course, and he is an instructor in the public school, and I think he can't say what Dan Wittig said, that he didn't learn. We are glad to say that we can learn, and some day we hope to have a little rivalry between the Philadelphia Branch and Newark Branch, that we are going to put up a competition to see how many members can analyze a solution and analyze it correctly, even if we have to offer a prize or another gold medal.

Now the difficulty, though, is this. It is among the men themselves. It is among you, it is among the men in a branch. You can't teach a man anything if he don't want to learn. Other branches have started. I have been watching some of the branches who start the things. But they will not sacrifice anything. All they think they have to do is to read about it and do something and that is all there is to it. Now you can't do anything that way. We have had members,—they didn't go as young as eighteen, but we did have them who could vote, but they run all the way up to 60, and I want

to tell you I was a member of that class, and I still am and will be next year.

Here is a point in the vocational schools. If any of you people get hold of a Board of Education, make this discrimination, that you have got an elementary class and an advanced class. If they want to know what the advanced class is, those are foremen, as I explained.

Now we have also told the Board of Education in the city of Philadelphia, "Wouldn't it be a wonderful thing if some members in that class, the advanced class, never graduate? Now get that point. They never graduate.Because we told them in electroplating, no electroplater could graduate from any place, no matter where he was, because they were never done learning electroplating. There is something new every year. And to prove and demonstrate that, we have conventions where they bring up something new and different every year. So we are never through and we cannot graduate. Because if we did graduate we would have to retire, and we can't do that because we need the money. Other Boards of Education are no different from ours in Philadelphia. And I think the Board of Education in Philadelphia is more hard-boiled than most.

We have been in that school four years, and we haven't discovered anything that would raise the prestige of that school, with the exception we did discover that the men we sent there and the men that attended there were red-blooded men and were willing to stick and were willing to learn. We discovered that. And we discovered also the members in the branch who were not willing to learn, who are always begging to find out something or know something, and expecting somebody to tell them, but they will never make a sacrifice of one minute's time to go to a school and become familiar with what they should learn.

And that is the secret of all those things. We can talk progressiveness, and educating the plater, and we can put out a definite program, we can do all those things, but we cannot put in the plater himself that he has got to accept it, because the minute he has to do that, he has not got the time; he can't get off; he has to play golf, or his kids are sick and he can't go down. There is always something. But all those things, I want to tell you, are not the things that hold you back, if you really want to do something. I stated here last night, with reference to the Research Fund, if you

want it, if you are willing to sacrifice something, and to concentrate, you can have anything you want, and that applies to education as well, in this big country where there are so many people who are willing to spend and sacrifice time to teach things for you. We have living examples in this room here tonight. We have a living example on the platform. And then to think that there are so many in our organization who refuse to learn, and are always kicking, "How are we going to learn?" But when you tell them, they don't want to accept it, and the secret of the whole thing is to educate the plater to learn to sell himself the idea, and it won't take long until we have this same system in every one of our Branch Societies.

DR. BLUM: I have heard that there are politicians in Philadelphia. I know now where they got their instruction.

Now I don't know whether there are other branches from which we might have experience.

MR. R. J. O'CONNOR: The rest of the Bridgeport delegates said we started it back in 1492, but I guess we won't go back that far.

Irwin S. Sperry, who was the founder of the Brass World, I dare say was about the first man to start teaching the platers in the vicinity of Bridgeport and the Bridgeport Branch the art of analyzing their solutions. Mr. Sperry had a fully equipped laboratory, at least of the times, and the boys used to go there at different intervals. I don't know whether they had any definite program or not, but they used to go there at least at intervals and learn the fundamentals of chemistry. Most of them were old members of the Bridgeport Branch. After Mr. Sperry died, the Bridgeport Branch bought out his laboratory. Not, however, the Brass World, which is now in existence. That, I believe, was printed in this same laboratory that the Bridgeport Branch bought out, and maintained up till about ten years ago. That was about the time that I came into the picture at the Bridgeport Branch. They kept that laboratory, and then they had Dr. Stanley, who was head of the chemistry work in the Bridgeport High Schools, and he took a very active interest in the teaching of the platers and also the electroplating problems, and he taught all of the members as much as he could, under the conditions, about chemistry. So that most of the older members of the Bridgeport Branch, it is safe to say, can analyze their own solutions.

About two years back, I believe we didn't do very much work. However, the platers at different times would come into their own

laboratory and run through their solutions when they were having trouble. And about two years ago we started another class there. We needed some new equipment and some reagents, and the like of that, and we adopted a plan much the same as Mr. Feeley spoke about here today of taking up a collection at all of the meetings. We did that, and merely passed around a hat. We didn't designate any sum that was to be given, and we accumulated quite a little money, and we bought a very up to date line of equipment, that is, with regard to burettes and reagents and the like of that, and we started anew, so that most of the members that came in had an opportunity to learn how to analyze the solution, and most of the older members who had probably not gotten up to the more up to date methods of analysis came in also, and we did that up to about a year ago and then we discontinued our rooms. We were paying a little bit too much for the rooms, and we discontinued them and split up the equipment, and I might add here that the branch made me a present of what was left of Mr. Sperry's library, which was very interesting. We have some books that date back as far as 1841, from England, on different metallurgical problems. Up to a year ago we were active, but in the past year we haven't done very much. However, we have appointed a committee, and they are going ahead and one of the large manufacturing plants at Bridgeport has offered us their laboratory, in which to come in at any time and analyze our solutions.

So I would say that we are in a fairly good position at the Bridgeport Branch. The only thing I could say from my observation is that possibly the most of the platers, the majority of them, don't analyze their solutions systematically; that is, they probably don't analyze them often enough, and that is going to be the thing we are going to try to stress in the next year.

MR. GEORGE GEHLING: There is one thing I want to explain; I cut off too quick before. It was this: It is up to the man himself as to what he wants to do. We had a class of thirteen men that we ran through a college course with Dr. Graham as the instructor, and they paid for the instruction, and they bought their glassware all themselves in this course, and I want to show you how that works out. I believe out of the thirteen men, there were eleven of them, their employers paid for the whole apparatus and the tuition fee. It only goes to show that no matter what you do, you think nobody is watching you, but you have got to learn to sell yourself and sell

your ability in that way. These men went to their employers and told them what they were going to do, that they were getting this and they wanted the apparatus so they could continuously analyze the solutions they were using in the shop, and learn how to do it, and that it was going to cost them this much; that they were willing to put in the time at night, going there, and the boss turned around and said, "Well, I'll give you the money to buy the stuff." So it only goes to show if you have any intention of doing those things and you really and positively want to do it, you will even find the money for it.

We had the same thing in Philadelphia Branch with a little reminder we get out. The people said, "Where do you get the money for it?" Well, we went out, we didn't care where we got the money for it. I don't mean to say we didn't care, but it came out of our dues. We didn't stop to think it was going to come from the wind, but we were able to finance it because we wanted to do it, and that is the same way with you. If you men go back to your branches with the thought and enthusiasm that you want to do something this year, you will do it. Most of the men tonight outside of Newark, I believe, have said how the classes dwindled down to nothing. We stand here as a living example in Philadelphia that we started with nothing, and we got some place, and are going to hold it, and that is a better report to make. I don't like to hear reports that "We started with 20 and went down to 8." Let's go the other way. Go back to your branches and start that way and make up your mind you are going to do it. You will sit there and smile and laugh and say that is another hard job; but I am going to tell you fellows I can't say it is a hard job, because our delegates from Philadelphia went back and did those things. And they are not superhuman. What they did, you can do, if you stop and think of the definite plan and go after it.

DR. BLUM: Now, without attempting to limit this discussion, I want to bring out one point at least, which if accepted or carried out might be the most important result of a meeting such as this. Suggestion has been made, and discussed informally by a few who are interested in this subject, that the indications are (and I think that is borne out by the meeting tonight) that there has been varied success, very different success in different branches, in the attempts to carry on classes; that the indications are that perhaps not more than half of the branches at the present time are carrying on

classes, and that it would be a benefit if we got together some definite suggested outline of instruction,—not a rigid course that has to be followed to the last letter, but something which would crystallize the experience that has been obtained and which we have heard necessarily very briefly tonight. And I believe that if this meeting feels that that is a good thing, it would be perfectly in order, even though this is not a business session at all, simply to make the recommendation, which can then be brought up in the business session, that the new officers appoint a committee on education, whose duty it would be as early as possible to make up a booklet, whatever form it might take, which would be available to all the branches to give advice and suggestions regarding the method of carrying on a course, the subject matter, the outlines of courses, and anything else the committee felt would be helpful. I would be glad to hear any discussion of such a proposal as that.

MR. R. W. MITCHELL: I would like to add a few thoughts to that, Dr. Blum. I have never taught electroplaters, but have taught college classes in electrochemistry and in that time, some ten years, accumulated a few ideas.

I think constructive ideas on planning courses such as this are very, very valuable, because one thing is, you take a group of men, eight, ten, twenty or thirty, and through some such meeting as this, or other meetings, work their enthusiasm up to the pitch where they are willing to put in their time for a whole winter, or series of weeks, and then the course to which they have committed themselves either isn't suited to their comprehension, or doesn't stimulate any enthusiasm in their minds for the work they are doing, and the thing becomes very flat, and they start to drop out, and that experience will always be in their mind, and it will be very much more difficult to bring them back to the pitch where they want to do something about it a second time.

Now to get a good course of instruction, we have had ample testimony tonight that we should have a plan, and I might add you not only should plan your work, but of course subsequently you should work your plan.

I think in teaching electrochemistry or any other science, it is very poor policy to attempt to lecture, have the class take notes, and get the information to their minds in that manner. They are apt to take imperfect notes, and in studying those not get their ideas well. It is better to outline, in the form of mimeographed notes or some-

thing like that, the schedule of your course; for each week, or each class, assign a certain amount of reading. A man should learn to use the technical literature, and that is a first-hand way of getting his information. Let him read a certain amount of an assignment and then in the class let the instructor merely answer questions that have arisen in that man's mind through his reading, instead of attempting to lecture to him; explain those parts he hasn't got.

Of course, that which he accumulates in theory should be fixed in his mind by actual laboratory practice. There is an old saying that you have to function at a thing to gain any facility in doing it. Now in the laboratory I think it is excellent to have the work arranged so that it is done more or less on a competitive basis. It makes more fun. You take twenty fellows and just assign so much work, let them struggle along as best they can; some of them don't get keyed up to a very high pitch, some may not be as energetic as others, and the class gets straggling so far behind the others. If definite amounts of work are spaced off, definite times, time of assignment in which that work shall be done, and reports given on it, and if those reports are graded, and all the grades are registered on some kind of a tabular scheme where all the classes can see it, they get a competitive attitude. The students will vie with one another trying to pile up credits like a baseball score or any kind of a game score, and I have found that very helpful in keeping the class together.

Another thing is this, I think it is an excellent illustration to say that many mediocre men who go to college develop into first rate men, not because they went to college so much, not because of what they learned there, the bare accumulation of facts, but because they got into a highly competitive atmosphere. They were meeting good men from other towns, and under the stimulus of that competitive feeling, that is, being with men who set a little faster pace than they were used to, they pulled their own pace up a little; where if they hadn't entered that field where the pace was a little faster, they would have remained mediocre men; by having pacemakers for them, they got accustomed to that faster pace and became much better men than they normally would have.

Now I think that is a big part of the value of this training for the electroplaters; not the mere knowledge of the analysis of solutions, but a quickening of your grasp on new work; merely through endeavoring to keep up with the other fellows, quickening of all your

faculties. And another thing that nobody has brought up in the discussion tonight, which would be a very great asset to such a course, would be a little revelation of the research viewpoint. A paper we heard this morning on plating at low pH's—that sort of thing can be discovered or worked out by anyone, regardless of whether he has had a highly technical education or not. Many of the greatest chemical or technical discoveries have come from men with very little technical training. Merely they had the research viewpoint, and that sort of thing is one of the points that is always stressed in a good technical college education today. Not the bare accumulation of facts that are laid down. You can get those in books. You can buy a fine fat book for about $5.00 just full of chemical facts. But it is the viewpoint, the utilizing of those facts. And I think that should be always brought in even in the simple courses which may be limited merely to analysis of plating solutions. The instructor should be a man who knows how to teach.

In planning the course, I think it is very important to exercise good judgment in getting an instructor, not a man who can say this, that, and so is this way; that is repeating merely the facts of a book. That becomes very boring. The instructor should have the ability to inspire, to kindle imagination, and not only give the bare facts but sketch in a little further beyond, and inspire the imagination of that man to see some of the research possibilities, to get him thinking of what might happen if this were done or that were done, or if we varied conditions this way or that. Of course, you can't spend a lot of time doing research, but once in a while a thought will come to you, and if that thought is carried forward may mean something very important.

That is all I have to say, and I think this planning work, this suggestion of Dr. Blum's of getting a uniform code, is very valuable and would lead to much greater interest in the classes by the men.

DR. A. K. GRAHAM: I heartily agree with the points mentioned by Dr. Mitchell, and I really believe to get a start in a branch where they haven't had the opp ortunity of really carrying on an intensive course, that it would be entirely possible if some committee were appointed to arrange what would constitute an elementary course which would involve instruction in the use of the apparatus, and the application of that knowledge to a few of the more common plating solutions which most all of you are obliged to operate. Just as

an illustration, if you were to have a committee outline mechanical methods of analysis, let's say, for nickel, cyanide copper, cyanide zinc, and both of them combined, cyanide copper and cyanide zinc, are involved in the analysis of brass, you cover four of the most common solutions that you are obliged to work with. If you were to go through a course designed to give you that alone, having learned how to operate the equipment and apply it to those analyses in a booklet like this (showing booklet), that could be followed by any of you. I believe that such a course would constitute an elementary course that could readily be covered in one winter's course in any branch, no matter what plan you follow as to the number of hours you devote to it. But the point that has been emphasized by most all the speakers tonight is involved in what I have said, that you have planned by some one group just exactly what your program would consist of and they would furnish all the information that would be required by whoever was going to give that course in your particular branch, and there wouldn't be any limitation to it as far as your being able to get it.

MR. S. P. GARTLAND: I might say that during the months of April and May, (we are fortunate in having in the Rochester Branch a number of chemists), one of the chemists in one of the large plants in Rochester, attending the meetings, thought it would be of interest to the platers to bring some of the equipment, the apparatus and so forth, and along with that, this booklet on the analysis of solutions by Oliver Sizelove, and he demonstrated how simple it was to get the chloride content. Naturally, that went over pretty big with the platers, and they became interested. On the next meeting night, he brought up the apparatus and each member brought along some of the nickel solution he was using. It was definitely stated he wanted to get samples of the different nickel solutions, and it was quite interesting to have the metal content analyzed, and then to see the different platers trying their hands at it. And in that way it created this enthusiasm that we started to bring about in the fall, as I stated, to have a class so that in the future, if this work keeps up, the Rochester boys will all be able to analyze their own solutions. And we are glad to know that there will be some definite plan whereby we may have an elementary book or, as you suggest, a committee to lay out something we may follow, and then each branch in time, their membership will be all familiar with it and be able to do their own analytical work, and,

as Dr. Mitchell said, it won't be long before they are going into research work.

MR. ALBERT HIRSCH: I too would like to concur in Dr. Graham's idea of having a committee to outline or plan this work, because we know from Philadelphia's experience that was the way we started out. We first had a committee to go to Newark and different places to see what was done, and then plan the work. We have found that the plater learns most aptly by using the burette and having his work laid out in a definite way, and trying to get it in a definite time. In other words, try to map his work in such a way that he can get through in two hours with a definite thing, and that is what we try to do in the vocational school in Philadelphia.

We found, take for instance where they went for chloride. Each member had his burette, and that was the only thing that was taught that evening, to go after that, and each one had an opportunity to perform about three titrations, and they compared the results and a certain degree of accuracy was found from that work. And that method was applied all the way through, and in that way they did learn, and they held the class, and the class was 100% all through the year, and I do think we concur in that respect, that we should have a committee to plan.

MR. JOHN FEELEY: Mr. Chairman, the hour is getting late. I think the conclusion from the expressions of opinion is that some procedure should be followed along this line, and if I am in order, Mr. Chairman, I move that the Secretary be instructed to bring before the Convention in the business session on July 3, a resolution that it was deemed, here tonight, desirable to have the incoming officers to appoint a Board of Education to outline a standard procedure for the education of the platers.

(Seconded)

MR. JOHN STERLING: It seems to me there would be no necessity of forming a new committee. We already have a Board of Education, and it seems to me that it should be referred to them, and that would be their function. Your Constitution provides for a Bureau of Education, and to my knowledge up to the present they have done nothing, and here is work for them, instead of a new committee.

MR. FEELEY: For a point of information, Mr. Chairman, might I ask the last speaker if any committee that is appointed in the session now ending holds office in the coming year?

MR. STERLING: That isn't the point I bring up. The point is, the Constitution provides a Bureau of Education, always has.

MR. FEELEY: My motion, Mr. Chairman, was that we recommend our Secretary bring this before our business session on the 3rd of July, this week, that it may be discussed, and then recommended to the incoming officers that they appoint this Board whatever it may be, and if in the Constitution we already have one, it will have to have new members in the coming year.

MR. F. J. HANLON: Might I inquire whether it is intended that this committee is to have control or to formulate for the information of the branches?

MR. FEELEY: I thought, Mr. Chairman, I explained that thoroughly, that the motion was that we recommend for the business session to recommend to the incoming officers that a Board be appointed to formulate a standard plan for education. That is, we have decided tonight we want a standard plan to work on; that it would be advisable to have a standard plan of instructions drawn up. Now that couldn't be done by one man; I should think we would want a committee.

MR. HANLON: Mr. Chairman, that isn't the sense of my question. I have no reference to the previous speaker's question, or motion. I am asking an individual question of information relative to the duties of this committee that Dr. Blum suggests. Is this plan just a plan by a committee to standardize for information, or is it a plan to be a permanent adopted plan that must be adhered to by the American Electro-Platers' Society.

DR. BLUM: I think,—simply giving my own opinion and the opinion of those with whom I have discussed the matter,—it would certainly be understood this committee would be purely an advisory committee, to make recommendations regarding courses, and of course every branch would still feel free to carry on those courses in the best way that they saw fit, taking advantage of anything they could in this book of suggestions.

MR. HANLON: That answers my question.

MR. GEORGE GEHLING: It has been said that we have an Education Committee. Now if you appoint a committee to formulate plans (I imagine that is what you are trying to get at) whereby they would be printed or typewritten and mailed to the branches, they could make use of them in getting their branches started. Now if you appoint a committee and they are to get this up, why,

they would want to report back here next year, and I don't think that would be satisfactory. I think it should be understood that such a committee would have the power to formulate the plan and then have it sent to the branches during the coming year instead of having it lie over until the next Convention.

MR. FEELEY: In reply to the last speaker, I don't know whether the Secretary was in the room when Dr. Blum outlined his personal opinion, combined with that of others that he spoke to. He then remarked that he felt something should be done, and it was concurred in by those who spoke, as soon as possible. Now that wouldn't be next year.

(The motion was carried)

(The session adjourned)

A. E. S. PAGE

Assembled Expert Scraps With and Without Significance

Why

has the modern plating room been given a place of honor in the layout of our best and most up-to-date manufacturing plants when within the memory of most of us it was considered only a necessary evil?

Why

does the Research Committee merit the support of the great body of American manufacturers to the extent that men are being kept at the Bureau of Standards in Washington, continually studying problems in electro-deposition, lacquers, etc., and have proved their worth by prescribing a cure for many of the ills which were an expense and a hindrance to the plater and his employer for years?

Why

do we not have more than twenty-five branches in our organization when there are great industrial centers that have not been reached, especially in the South and West? Los Angeles, one of our youngest branches, has a very contagious spirit and it is entirely possible that San Francisco and other cities in California will soon catch the fever and be enrolled in the A.E.S.

Why

don't the branch secretaries send to the REVIEW a fuller report of the meetings? There is much to be learned from the papers read and discussed. Then, too, there is the Question Box—many a plating room problem has been solved by simply placing a question in the box and having the other members of the branch help in its solution. The MONTHLY REVIEW is not fulfilling its mission if it fails to aid its readers in the every-day problems of the shop.

Why

an annual convention anyway? Indirectly a great many of our members have felt the benefits of such a meeting, but the realism of it only comes home to us when we attend the gathering together of the best minds in the plating industry and partake of the social business, and educational advantages connected therewith. Now is the time to prepare for a visit to our next annual convention in Rochester, N. Y., June 29-30, July 1-2, 1931.

PRESIDENT'S LETTER

This is a very good time for any member who has an idea in connection with the Educational work the Society should do, to go to your branch meeting and explain it to the branch representative on the Educational Committee, and he will take up the same with the Chairman of that committee.

No doubt every member has a thought at some time of submitting something to benefit the Society, every suggestion may be another link forged in this Educational Chain, so see that your idea is linked up in this chain. DO IT NOW. You may think it not worth while, but give the committee a chance to talk it over with you.

All the delegates at the Washington convention voted for the Society to get the Educational Bureau started, and as we have formulated plans along these lines we need the assistance of these delegates at the branch meetings to get this committee to function properly. So far only six branches out of twenty-five have taken any action. This is a very poor showing for such an important committee as this Educational Bureau can be made to be by the proper interest shown at the branches, so we are appealing to all the delegates as well as the officers of the branches to see that they elect or appoint a representative on the Educational Bureau and also answer your questionnaire.

For the benefit of the members of branches we will again list the names of the branches who have elected representatives and sent in their questionnaires, and if you belong to a branch whose name is not among the following named branches: Chicago, Waterbury, Los Angeles, New York, Baltimore-Washington, and Philadelphia, attend your next meeting or write your officers about it and assist them to get in line with those who are now trying to look after your welfare.

Let's see your branches name in the December REVIEW.

The Research Committee have organized and some of these members attended the Electrochemical Society's Convention in Detroit on September 27, and at the conclusion of the convention the following members of the Research Committee met and discussed the research work informally:

J. HAY, *Chairman*
C. F. NIXON
A. K. GRAHAM (representing Dr. Lukens)
O. E. SERVIS
W. BLUM
H. A. GILBERTSON (representing Pres. Gehling)

Chairman Hay, Dr. Blum and Secretary-Treasurer Gilbertson reported the following to this office:

It was agreed that immediate steps be taken toward the appointment of a Research Associate. The qualifications of the various applicants were discussed and the opinions favored the selection of a person with considerable experience in this field, and it was practically agreed that Mr. W. C. Strausser of Detroit would be the man to represent our Society at the Bureau of Standards.

GEO. GEHLING, *President.*

PHILADELPHIA BRANCH

The regular monthly meeting of Philadelphia Branch October 3 at the University of Penna. Owing to the absence of the President and Vice-President, Supreme Pres. Gehling occupied the chair.

Banquet and Educational Committee reported progress. The paper read at the Washington Convention on Cadmium Plating was read and discussed.

Analysis of a Chromic Acid Solution for Sulphuric Acid

1—Heat crucible, to a red heat, over a bunsen burner, then put in a desiccator to cool.
2—With a 10 cc pippette transfer a 10 cc sample of the bath into a 300 cc beaker.
3—Add 100 cc of distilled water.
4—Add 10 cc of conc. hydrochloric acid.
5—Add 10 cc of 95% ethyl alcohol and boil.
6—After boiling add 100 cc of water.
7—Add 10 cc of barium chloride, slowly, and boil a few minutes. Then set aside for 24 hours.
8—Weigh crucible carefully and put it back into desiccator. Record weight in place provided for it.
9—If 24 hours have elapsed, filter the barium sulphate out carefully.
10—Wash precipitate a few times with hot water. Put precipitate together with filter paper in crucible and ignite.
11—After ignition, put crucible and precipitate in desiccator to cool.
12—Weigh crucible and precipitate, record weight in place provided. The difference in weight equals the weight of the barium sulphate.
13—The weight of the barium sulphate multiplied by the factor 5.56 equals oz./gal. of sulphuric acid in bath.

Wt. of crucible and precipitate.
Wt. of crucible.
Wt. of barium sulphate.

Analysis of Chromic Acid
Solution for Chromic Acid

1—Place hydrometer jar on a level table and fill it with a sample of the bath.
2—Read sp. gr. and record it.
3—Look in body of table opposite sp. gr., just read and find concentration of chromic acid.
4—Sp. gr. reading:

TABLE
Chromic Acid Content at Given Densities

Specific gravity at 15° — C. 40	Baume at 60° F.	Chromic Acid Oz./Gal.	Specific gravity at 15° — C. 40	Baume at 60° F.	Chromic Acid Oz./Gal.
1.01	1.44	2.0	1.18	22.10	34.4
1.02	2.84	3.9	1.19	23.20	36.4
1.03	4.22	5.8	1.20	24.20	38.6
1.04	5.58	7.6	1.21	25.20	40.3
1.05	6.90	9.5	1.22	26.20	42.3
1.06	8.20	11.4	1.23	27.10	44.2
1.07	9.50	13.4	1.24	28.10	46.2
1.08	10.07	15.3	1.25	29.00	48.2
1.09	12.00	17.3	1.26	29.99	50.2
1.10	13.00	19.1	1.27	30.80	52.2
1.11	14.40	21.0	1.28	31.70	54.5
1.12	15.50	22.9	1.29	32.60	56.5
1.13	16.70	24.8	1.30	33.50	58.7
1.14	17.80	26.8	1.31	34.30	60.7
1.15	18.90	28.8	1.32	35.20	62.7
1.16	20.00	30.6	1.33	36.00	64.8
1.17	21.10	32.6	1.34	36.80	67.0

GEO. GEHLING, *Editor.*
PHILIP UHL, *Secretary.*

MILWAUKEE BRANCH

On October 9, 1930, Milwaukee Branch, A.E.S., held a grand booster meeting, at which time a large membership of 32 members were present, also Chicago brother member, Mr. White, and a Mr. Hermonson of Badger Manufacturing Company of West Allis, Wis. Were very sorry not to have our Mr. R. Goodsell present, as he was to have a paper on Copper Plating Pitting and Its Cure. After a lengthy discussion on round table talk, this was turned over to librarian, after meeting adjourned. Members enjoyed lunch and other refreshments.

JOHN N. HOCK, *Secretary-Treasurer.*

WATERBURY BRANCH

Engineers Hall was pretty well filled when Vice-President Barrie A. Hackett called the last meeting of Waterbury Branch, A.E.S., to order. Our old friend, George B. Hogaboom, was the speaker of the evening, and accounted for the large gathering. Close on to ten years ago, in the same hall, Mr. Hogaboom, who was greatly instrumental in forming Waterbury Branch, was elected its first president. Ever since the local Branch has felt honored and enjoyed the presence of Mr. Hogaboom in its midst, and the present occasion was no exception.

Previous to answering the questions found in the question box, the speaker talked on plating matters in general. Talked on the strides plating was making, saying that it was not so many years ago that most plating was principally for ornamental purposes, but today it was for protection against corrosion. Predicted that inside five years definite specifications for plating would be called for; certain solutions would be discarded, and some within two years. The trend of things indicated such. Felt sure that plating would not be replaced by rustless steel and iron, as better plating was coming. A few remarks were made on low pH nickel solutions with promises of more in the future. Rubber lining for nickel tanks and calcium chloride spray were also touched upon. The questions submitted were of a varied nature, and the answers and discussions that ensued proved interesting to all present.

During the meeting a circular was read, which is being put out by the Manufacturers' Association of Connecticut, relative to a course in practical control of plating solutions, which it is going to sponsor. The course, which starts Thursday evening, Nov. 6th, will take place at the Weaver High School, Hartford, and will consist of twenty lessons. Instruction will be furnished by Mr. C. L. Wood, metallurgist and electroplater for Landers, Frary & Clark, New Britain, Conn.

The circular states an investigation has led the Association to believe that the accurate control of plating solutions is an important step in securing uniformity in finish on polished surfaces and high resistance to corrosion, and that a widespread demand exists throughout the State for practical training in this subject.

The committee on speakers announced that for our next meeting, which takes place Friday, Nov. 14th, arrangements were being made to have a speaker the announcement of whose name should bring out every member and all others interested in plating matters.

Delegations from both Bridgeport and Hartford Branches were present at the meeting.

W. F. GUILFOILE, *Secretary.*

NEW YORK BRANCH

The regular meeting of New York Branch was held in World Building, Park Row, N. Y. C., on Friday, September 12, 1930—Vice-President Ligouri presiding.

We are sorry to report the illness of our President, Mr. F. Haushalter, who was seriously ill, and are glad to report he is on the road to recovery.

Cleaning methods for preparing work for chrome plating were discussed,

one member giving the following formula for steel or iron: 1 gal. water, 3 ozs. sulphuric acid, 12 ozs. sodium bisulphite; use pure carbon anodes, keep out brass and copper.

Our second meeting was held on September 26. Dr. L. C. Pan addressed the members on the constituents of plating solutions, advising the members to make their solutions as simple as possible. By doing so it is an easier method to check up on. His talk finally settled on cyanide solutions for oxidizing. Samples were passed around showing results with solutions of different formulas. Best results were obtained with cop. cyanide 2.7 ozs., sodium cyanide 3.5 ozs., sodium chloride 1.9 ozs., hypo. 0.06 ozs.

A rising vote of thanks was extended to Dr. Pan for his able talk which was thoroughly enjoyed by all present.

ARTHUR GRINHAM, *Recording Secretary.*

CLEVELAND BRANCH

Cleveland Branch held its monthly meeting on Saturday evening, October 4, at Hotel Winton.

President E. Steen Thompson called the meeting to order.

The chair welcomed our new member, Mr. H. A. Weber.

The business of the meeting being concluded, our Librarian, Mr. W. D. Scott, read a paper on "The Introduction of Iron into Alkaline Cleaning and Plating Solutions," by Mr. F. J. Liscomb.

This paper was well received and every one present took part in the discussion of it.

Our Librarian promises to have an interesting paper read for discussion at each meeting and it is hoped more members will come and get the different ideas and give theirs.

Cleveland Branch held an outing and clambake on a farm at Geauga Lake, Ohio, on Saturday, September 27th. A good crowd enjoyed themselves.

Mr. J. C. Singler has been elected to represent our Branch on the Educational Bureau.

PAUL R. STAMM, *Secretary.*

BALTIMORE-WASHINGTON BRANCH

The first meeting for the 1930-1931 season of the Baltimore-Washington Branch was held on Saturday, October 4, at the Bureau of Standards, Washington, D. C.—Thomas F. Slattery, our president, presiding.

Dr. Wm. Blum gave a very interesting talk relative to the Educational Class for the coming year. It was decided that we will hold fifteen classes during the year, at the Bureau of Standards, Washington, D. C. The dates and topics outlined are as follows:

October 11—Lessons on the Care and Use of Apparatus.
October 25—Analysis of Cleaning and Pickling Solutions.
November 8—Analysis of Acid Copper Solution.
November 22, December 13—Analysis of Nickel Solution.

January 10—Analysis of Silver Solution.
January 24—Analysis of Cyanide Copper.
February 14—Analysis of Gold Solution
February 28—Analysis of Acid Zinc.
March 14—Analysis of Cyanide Zinc.
March 28—Analysis of Cadmium.
April 11—Analysis of Brass Solution.
April 25, May 9—Analysis of Chrome Solution.
May 23—Analysis of Black Nickel.

After which we proceeded with the regular business meeting.

After the reading and approval of the minutes of the previous meeting, we had the report of our annual picnic held at Beverley Beach, Md., August 9th.

The Society then took up the matter of our Annual Banquet to be held on January 31, 1931, in Baltimore, Md.

Mr. Wilbert S. Ermlich was made Chairman of the Program.

MATHEW J. KRAFT, *Chairman*
GEO. F. P. TURNER
HERMAN J. HELLER

appointed Hotel Committee.

Our President announced the appointment of Dr. Wm. Blum to represent the Baltimore-Washington Branch on the Bureau of Education.

There were 19 members of the Branch present at the meeting.

The following is a copy of the financial report of the 18th Annual Convention of the A.E.S. held at Washington, D. C., 1930:

RECEIPTS

From the Detroit Branch	$ 150.00	
Advertising in Program	3140.00	
Registrations	2466.00	
Total Receipts		$5756.00

EXPENDITURES

Printing and Mailing Programs	$1188.05	
Badges	440.00	
Motor Buses, Theatre Party, Box Lunch, Etc.	1397.61	
Hotel Banquet, Etc.	1407.00	
Donation Rochester Branch 1931 Convention	150.00	
Research Fund	100.00	
National Society	150.00	
Total Expenditures		$4832.66
Balance		$ 923.34

Respectfully submitted,

IRVIN H. HAHN, *Secretary-Treasurer.*

ROCHESTER BRANCH

On Friday evening, September 26, at the Powers Hotel, Rochester Branch held their monthly meeting, with President Reama in the chair. The speaker, Mr. R. E. Pettit of the Aluminum Company of America, Buffalo, N. Y., gave a talk on Plating Aluminum with Nickel and Chrome, also told of the many colors that could be obtained on this metal. His exhibit was very good. Mr. Pettit's talk I dare say was one of the best ever given before Rochester Branch. Other branches will not be sorry if they call on Mr. Pettit. Mr. Arthur Thurber of the Oneida Community, Ltd., Oneida, N. Y., was to have given a talk on silver plating, but he was detained by business and could not get to Rochester. We hope to hear Mr. Thurber in the near future. On Saturday, September 27, we held our annual outing and clambake at the Old Homestead on Irondequoit Bay. The sports opened with a ball game between Pres. Reama Old Timers and Bill Hart's Colts. Reama team won the cigars. Many games were run off for the ladies, but I think special mention should be made of the balloon and fish race for the ladies and the egg race for the men. The bake was opened at 6:30 p. m. and all enjoyed the dinner with the help of the Stark Melody Boys' Orchestra. Mr. S. P. Gartland won the Pluto Water for eating all the clams. He had all the clam shells on his plate. I wonder where he got so many? Our only regret was that Mr. and Mrs. Horace Smith were not able to be with us. The committee in charge are to be congratulated for the success of this meeting and outing. Those in charge were Mr. G. A. Lux, Mr. J. D. Elster, Mr. Frank Mesek, Mr. Wm. D. Hart and Mr. Clarence Reama. Our school in plating chemistry will start on October 17. Mr. Lux will be in charge, and all who can possibly attend are urged to do so. The National Convention will be held at Rochester on June 29-30, July 1-2, 1931. The following committee were appointed to arrange for the hotel: Mr. R. P. Lopez, Clarence Reama and Charles Griffin. With our school under way and the National Convention in Rochester next year we expect a very busy winter.

CHARLES GRIFFIN, *Secretary.*

HARTFORD-CONNECTICUT VALLEY BRANCH

The Hartford-Connecticut Valley Branch held its first fall meeting, Monday evening, September 22, at the Hartford Chamber of Commerce, 805 Main Street, Hartford, Conn.

The meeting was called to order at 8:15 with President Beloin in the chair. Minutes of the previous meeting were read and accepted. All communications were read and placed on file. All bills were voted to be paid. One application was received from Mr. J. C. Rogers, of New Britain, and was voted upon for publication.

After our regular business had been transacted, W. J. Kennedy, our newly elected Supreme Editor, and delegate from our Branch to the National Convention, gave a very interesting account of what took place at the Convention this year.

"Bills" talk was of much interest, and as a result we were better able to understand the work that the newly elected Educational Committee is to do.

In connection with this plan, we elected Mr. F. J. Clark, of Springfield,

Mass., and Mr. T. E. Elwin of Waterbury to represent our Branch in this work. Plans are being made to hold classes in solution analysis, both in Springfield and in Hartford.

We were also pleased to hear a few remarks from Mr. O'Connor, newly elected First Vice-President, from the Bridgeport Branch.

Dr. L. C. Pan was then introduced, and gave a very interesting talk on "The Throwing Power in Copper Cyanide Plating Baths."

The method used in the measuring of the throwing power was as follows: A metal tube one half inch in diameter and three inches long was used. The tube was threaded on one end, on which a metal cap was screwed. A scale was computed as follows: If the copper threw into the tube a distance equal to the diameter of the tube, it represented a point of 100. By unscrewing the cap on the end of the tube one could easily see if metal was deposited on the cap. If a tube three inches long and one half inch in diameter was used, and metal had been thrown so as to deposit on the cap, a point of 600 was obtained, which would be rated as exceptionally good.

In connection with the experiments, four addition agents were used, and the results carefully recorded. A standard bath was made up consisting of 2.7 oz./gal. of copper cyanide and 3.5 oz./gal. of sodium cyanide. A current density of 12.3 amps./sq. ft. was used, and the baths operated at room temperature (68° to 72° F.).

The first addition agent used was sodium carbonate. It was found that as high as 20 oz./gal. could be used, but the best throwing power was obtained at 5 oz./gal. Above that amount the throwing power decreased. The finish of the deposit was quite dark.

The second addition agent studied was the use of "hypo." It was added to the amount of 3/10 of an ounce per gal. Three-tenths of an ounce being the maximum. The best throwing power was reached at .07 oz./gal. Above that the throwing power decreased. A solution that contains only copper cyanide, sodium cyanide and "hypo" can be operated, but a pressure of fourteen volts is required at a C. D. of 12.3 amps./sq. ft; so for practical use is undesirable. The finish of the deposit is quite bright. A bath containing excessive "hypo" is not adaptable for copper plating work that is to be oxidized.

The third addition agent to be studied was sodium hydroxide (caustic soda). Amounts ranging from 0 to 8 oz./gal. were used. The best throwing power was obtained at 1.75 oz./gal.. So it is possible to operate a bath without the use of carbonates. The finish of the deposit is of a dull malt color.

The last addition agent to be studied was sodium chloride (common salt), and was used in amounts from 1 to 7 oz./gal. The increase in throwing power is not so noticeable, with each addition, as it was in the former tests, but the range in amounts used to obtain good results is greater. Best throwing power was obtained at 2.5 oz./gal., and the limit for bright deposits with maximum throwing power was 2¼ to 4 oz./gal.

In summarizing Dr. Pan's talk, we should say that there are four types of baths that could be used for practical plating. These four baths are as follows:

Bath No. 1

Copper cyanide	2.7 oz./gal.
Sodium cyanide	3.5 oz./gal.
Sodium carbonate	3.0 oz./gal.
"Hypo"	0.6 oz./gal.

Bath No. 2

Copper cyanide	2.7 oz./gal.
Sodium cyanide	3.5 oz./gal.
Sodium carbonate	3.0 oz./gal.

Bath No. 3

Copper cyanide	2.7 oz./gal.
Sodium cyanide	3.5 oz./gal.
Sodium chloride	3.0 oz./gal.

Bath No. 4

Copper cyanide	2.7 oz./gal.
Sodium cyanide	3.5 oz./gal.
Sodium hydroxide	2.2 oz./gal.

The following questions were asked:

Question—What do you consider the most practical bath to use?

Answer—Bath No. 1 as listed above.

Question—Does the caustic soda in the copper bath remain stable?

Answer—Yes, providing the solution is operated at room temperature. If the temperature is increased, the caustic soda is changed to sodium carbonates.

Question—What will an increase in temperature do?

Answer—An increase in temperature will decrease throwing power, but increase conductivity.

Question—Will the sodium chloride remain quite constant in the solution?

Answer—Yes. The only loss is through solution dragout.

Question—In the above formulae where 2.7 oz./gal. of copper cyanide is used along with 3.5 oz./gal. of sodium cyanide, how much of the sodium cyanide is used up in dissolving the copper cyanide?

Answer—About three ounces of the sodium cyanide is used to dissolve the copper cyanide; leaving approximately one half ounce per gallon as "free sodium cyanide."

There being no further questions, Dr. Pan was given a rising vote of thanks for his very interesting and instructive talk.

The meeting was attended by thirty-six members and visitors, and was adjourned at 10:45 p. m.

V. E. GRANT, *Secretary.*

NEWARK BRANCH

The first of the fall and winter meetings of Newark Branch was held October 9 with an attendance of 93 members and friends. President D. Calabreese was in the chair. Minutes of the last meeting were read and approved.

Voted to dispense with the regular order of business.

Mr. P. Oldham introduced Mr. George Hogaboom, the speaker of the evening, who gave a most interesting talk on the Deposition of Silver on Glass.

The first process for plating on glass was known as the "pouring process." This was brought out by Mr. John Scharling, Newark, N. J. It is essentially the same as the process now used in the making of mirrors. The articles after being covered with the silver film were plated from 36-48 hours. The surface was then sand-bobbed and tripoli buffed. After cleaning a design was painted on the silver with an asphaltum resist. The unprotected parts were etched away with nitric acid. The design had to be well connected as there was no adherence of the silver to the glass.

About 1903 Mr. Scharling improved the process by developing a silver paint so that the design could be painted upon the glass. This paint consisted of finely powdered silver, fluxes and oils—very similar to any colored paint used for china decoration. The article after decoration was placed in a kiln and the silver "burned in." At a temperature of approximately 1000° F. the oils volatilized and the flux acted upon the silver and glass and a firm adherent film of silver was had on the glass. This permitted the decorating of the glass with detached designs and monograms. The plating was done in the same way as previously. It was, however, now possible to deposit a heavy coating of silver without any roughness.

Mr. George Ohl, who had been with the silver deposit business since its beginning as a designer and decorator, processed samples while Mr. Hogaboom talked. This demonstration proved of interest. Mr. Ohl and Mr. Hogaboom displayed a large number of finished pieces as well as a piece illustrating each step in the process.

DETROIT BRANCH

Detroit Branch held its regular monthly meeting Friday evening, October 3, at the Statler Hotel. An address by our presiding officer, Mr. Jos. H. Hansjosten, was well received.

CHAS. M. PHILLIPS, *Secretary.*

(Extracts from Address by President Jas. H. Hansjosten)

There seems to be a lack of interest in our membership, which is evidenced at a small attendance at meetings and by some of our oldest members allowing themselves to become suspended. What causes this lack of interest? That is one of the questions we must answer. And the quicker we find the answer, the quicker can we apply a remedy.

Your speaker believes there are a number of causes for this lack of interest. One of them is that we fail to make our meetings interesting enough to attract a large attendance. The remedy here is obvious, and can be applied if we all put our shoulders to the wheel and push ourselves out of the rut. This is but one matter that in your speaker's opinion causes a lack of interest, others will be touched on later, so this one will be discussed first.

You are aware that President Gehling has appointed Mr. Albert Hirsch chairman of the Educational Bureau and our Branch is to have a member on that Bureau. That member should be appointed tonight, and your

speaker proposes that a Branch Bureau of Education and Information be formed, the chairman of our Branch Bureau to be our representative on the Supreme Bureau, and our Branch Bureau should work with the Supreme Bureau and aid our members with all the information they may need in overcoming the problems they encounter in their work. The Branch Bureau should be so organized that they can give the help or information needed as quickly as possible when a member calls for it, for we all know that when we need help we usually need it quickly.

The Branch Bureau should as far as possible have some subject for discussion at our meetings, and should, with the aid of the Librarian, find the correct answer to the questions in the question box, that may not be answered at the meeting at which they are asked.

In the early days of the Society the owners of plating plants took a great interest in the Society. In some cases this is still so. Many manufacturers must believe in us or they would not have contributed so liberally to our Research fund. Why, then, is there not a similar feeling in Detroit? Your speaker believes it is because we fail to "sell" our Society to our employers.

If you will consider the aims and objects of our Society and what it has accomplished during its existence, you will agree with me when I say that the A.E.S. has been the greatest single factor in bringing the plating industry to its present high standard of efficiency. Then why should not the manufacturer be informed of what we have done and are still doing?

Let us then "sell" our Society to our employer and to every plater's employer. Let us tell him the story of the A.E.S. Let us tell him that he will gain much by giving up his moral support, and that his platers will gain much by belonging to our Society. There is no question that if we let every manufacturer know what our Society really is, what it really means in the plating industry, our membership will increase, and with it interest in our meetings will increase, and every one of us will get more out of our Society than we can ever put in it.

BOSTON BRANCH

Boston Branch met on Thursday, October 16, at the American House at 8 p. m.

This meeting should have been held on the first Thursday of this month but was put over until the 16th.

After the regular order of business the committee that has been working on the forming of a chemistry class made a report on what they have done so far but will have the report for the next meeting.

Another committee is working on the speakers for the winter as we expect to have larger meetings this year than we had last year.

A discussion of the analysis of solutions held the floor until the meeting adjourned at 10 p. m.

A. W. GARRETT, *Secretary.*

CHICAGO BRANCH

The regular monthly meeting of Chicago Branch, A.E.S., was held Saturday, October 11, 1930, at the Atlantic Hotel.

The meeting was called to order with President S. J. C. Trapp presiding and all officers present.

The usual Branch business was transacted as quickly as possible, and the meeting turned over to the "Old Timers."

It was gratifying to see so many of the older men turn out, and it was very interesting to listen to their various experiences.

Much credit is due these men, for their work has made the Society what it is today.

The attendance was over 100. Milwaukee and Detroit Branches were represented.

Smokes, refreshments and souvenirs were enjoyed by all. The time in between talks was spent in singing the old time songs, and it was with much regret that the meeting came to a close at 10:30 o'clock. The question box was dispensed with at this meeting.

J. C. KRETSCHMER, *Secretary and Treasurer.*

ST. LOUIS BRANCH

Regular meeting of the St. Louis Branch, A.E.S., was held at the Warwick Hotel on Friday evening, September 12, at 6:15 p.m.

Dinner was served before the meeting.

Minutes of previous meeting were read and approved. Roll call of officers showed one member absent.

Mr. Musick made a report of the convention and said it was very well conducted and every one said the papers were very good.

Meeting was then turned over to Mr. H. H. Williams, our Librarian, who outlined some of the things that he will do for the coming year, so it was left up to him to arrange for the next meeting. Meeting adjourned.

C. T. MCGINLEY, *Secretary.*

CORRECTION

Mr. Joseph L. Dinan, Philadelphia Branch, was incorrectly placed in the list of deceased members in the last month's issue. We are glad to learn that Mr. Dinan is very much alive and hope he will live to enjoy many years of prosperity in spite of the mistake, for which we are extremely sorry.

TRANSFERS

E. R. WILLIAMS.....From Chicago Branch to Los Angeles Branch (Active)
CHAS. KARCHER.....From Newark Branch to New York Branch (Active)

APPLICATIONS

	Branch
Wade Sterling, 1025 Market St., Parkersburg, W. Va.	Baltimore-Washington
Richard M. Wick, Bureau of Standards, Washington, D. C.	Baltimore-Washington
Joseph J. Mergl, Newport News, Va.	Baltimore-Washington
Wm. Scott Felton	Rochester
Chas. F. Heines, 1015 Summit Ave., N. Y.	New York
Mr. Mears	Newark
Austin Fletcher	Newark
Mr. Owens	Newark
Boleslaus Bugwinski, 437 First Avenue, Milwaukee, Wis.	Milwaukee
Chas. R. Walsh, 107 Elm Street, Naugatuck, Conn.	Bridgeport
John M. Barry, 701 Winchester Avenue, New Haven, Conn.	Bridgeport
Henry E. Wagner, 27 Collins Street, Hamden, Conn.	Bridgeport
Vittorio Sacchi, c/o Olivetti & Company, Jurea, Italy	New York
Walter Ramsbottom, 856 Hibernia Road, Point St. Charles, Montreal	Montreal
William Glass, 1129 Iowa Street, Dubuque, Iowa	Chicago
J. C. Rogers, New Britain, Conn.	Hartford-Connecticut Valley

ELECTIONS

Joseph T. Moran, assoc. member	Philadelphia
Boleslaus Bugwinski, 437 First Avenue, Milwaukee, Wis.	Milwaukee
Chas. R. Walsh, 107 Elm Street, Naugatuck, Conn.	Bridgeport
John M. Barry, 701 Winchester Avenue, New Haven, Conn.	Bridgeport
Henry E. Wagner, 27 Collins Street, Hamden, Conn.	Bridgeport
Vittorio Sacchi, c/o Olivetti & Company, Jurea, Italy	New York
Walter Ramsbottom, 856 Hibernia Road, Point St. Charles, Montreal	Montreal
William Glass, 1129 Iowa Street, Dubuque, Iowa	Chicago
Chas. E. Clinindin, 1652 N. 80th St., Chicago, Ill.	Chicago (Assoc.)
Wm. D. Putnam, 1657 W. 61st Street, Chicago, Ill.	Chicago
Myer Roter	Newark
Wm. Hodecker	Newark
Everett Ward	Newark
Carl Greiner	Newark

SUSPENSIONS

George Barrow, 502 Carlyle Place, Indianapolis, Ind.	Indianapolis
Richard Crooks, 101 W. Washington Street, Brookfield, Ill.	Indianapolis

RESIGNATIONS

Louis Schulte, 4001 W. 25th Street, Cleveland, Ohio	Cleveland

RESEARCH COMMITTEE

Chairman, JACOB HAY,.....6920 Ottawa Ave, Chicago, Ill.
Sec.-Treas., PHILIP SIEVERING,.....20 South Crescent, Maplewood, N. J.
S. E. HEDDEN, ...227 Fifth Ave., Aspinwall, Penn.
WILLIAM F. GUILFOILE, ...14 Oakland St., Waterbury, Conn.
DAN WITTIG,.....378 Third St., Milwaukee, Wis.
DR. WILLIAM BLUM,.....Bureau of Standards, Washington, D. C.
MR. OSCAR SERVIS,..... .....5305 Warner Ave., Chicago, Ill.
MR. N. E. ZADOWSKI,.....1383 W. 65th St., Cleveland, Ohio
MR. W. S. BARROWS, ...628 Dovercourt Road, Toronto, Canada

BUREAU OF EDUCATION

Chairman, MR. ALBERT HIRSCH,.....1945 Airdrie St., Philadelphia

Branch Representatives:

Chicago Branch.....OSCAR SERVIS
Waterbury Branch.....ELLSWORTH CANDEE
Los Angeles Branch.....M. D. RYNKOFS
New York Branch.....HENRY LEVINE
Philadelphia Branch.....DR. A. K. GRAHAM
Baltimore-Washington Branch.....DR. WM. BLUM
Cleveland Branch.....J. C. SINGLER
Hartford-Connecticut Valley.....TENNANT ELWIN, FRANK J. CLARK

Other Branch Representatives will be printed as received.

BALTIMORE-WASHINGTON

Meets in Enoch Pratt Library, Calhoun and Hollis Sts., Irvin E. Hahn, Secretary, 207 E. Henry St., Baltimore, Maryland.

BOSTON

Meets at American House, Boston, Mass. First Thursday each month. Secretary A. W. Garrett.

BRIDGEPORT

Meets first and third Friday of each month at Chamber of Commerce Rooms, Stratfield Hotel, Secretary. Wm. Ehrencrona, Box 301, R. F. D. No. 1., Bridgeport, Conn.

CHICAGO

Meets second Saturday of each month, at 8 p. m., Atlantic Hotel, 916 S. Clark St. Secretary, J. C. Kretschmer, 1914 Warner Ave.

CINCINNATI

Meets every Thursday, 7:30 p. m., at Vocational Training School, Spring and Liberty Sts. Secretary, Al Yeager, 2021 Sherman Ave., Norwood, Ohio.

CLEVELAND

Meets first Saturday of each month at Hotel Winton, Paul R. Stamm, Secretary, 947 Elbon Road, Cleveland Heights, Ohio.

HARTFORD-CONNECTICUT VALLEY

Meets fourth Monday in each month alternately at the Chamber of Commerce 815 Main St., Hartford and the Chamber of Commerce 134 Chestnut St., Springfield. Secretary Vernon Grant, 43 Putnam St., Bristol, Conn.

DAYTON

Meets first Saturday of each month at the Y. M. C. A., Dayton, Ohio. Secretary, Robert G. Seaman, 2734 Ridge Road, Dayton, Ohio.

DETROIT

Meets the first Friday of each month at the Hotel Statler, Louis II Room, Detroit. Secretary, Chas. Phillips, 18421 Camden Ave., Detroit, Mich.

GRAND RAPIDS

Meets on the second Friday of each month at 528 Lake Michigan Drive, N. W. Secretary, Jacob Van Dyke, 1361 Union Ave., N. E., Grand Rapids, Mich.

INDIANAPOLIS

Meets the second Saturday of each month at Hotel Denison. Secretary, Louis Mertz, 1725 Union St., Indianapolis, Ind.

LOS ANGELES

Meets second Wednesday of each month at the Pig 'n Whistle, 207 W. 7th St., Los Angeles, Calif. Secretary, M. D. Ryukofs, 1854 W. 25th St., Los Angeles, Calif.

MILWAUKEE

Meets second and fourth Thursdays of each month at Cor. 3rd St. and Highland Ave. J. N. Hook, 1229 W. 24th St., Milwaukee, Wis.

MONTREAL

Meets every second and fourth Friday of each month at 1437 Aylmer St. Montreal, Quebec, Canada, where the Secy-Treas. Mr. Charles Doherty, can be found at any time.

NEWARK

Meets first and third Fridays of each month at Franklin Hall, 41 Franklin St., Newark, N. J., at 8 p. m. Secretary-Treasurer, Geo. Ruster, P. O. Box 201, Newark, N. J.

NEW YORK

Meets every second and fourth Fridays of each month in the World Building, Park Row, New York City, N. Y. Secretary-Treasurer, J. E. Sterling, 2561 46th St., Astoria, L. I.

PHILADELPHIA

Meets first Friday of each month in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Sts. Secretary, P. Uhl, 2432 North 29th St., Philadelphia, Pa.

PITTSBURGH

Meets first Friday of each month at 8 p. m., at downtown branch, Y. M. C. A. Secretary, S. R. Haddan, 227 Fifth St., Aspinwall, Pa.

PROVIDENCE-ATTLEBORO

Meets first and third Thursday of each month at 44 Washington St., Prov. Engineers Rooms, Providence, R. I. Secretary, J. H. Andrews, 19 Rosedale St., Providence, R. I.

ROCHESTER

Meets every third Friday of each month at the Powers Hotel. Secretary, Chas. Griffin, 14 Garson Ave., Rochester, N. Y.

ST. LOUIS

Meets second Friday of each month at Central Y. M. C. A., 19th and Locust St. Secretary, C. T. McGinley, 3214 Fairham Ave., University City, Mo.

TOLEDO

Meets first Thursday of each month at Toledo Secor Hotel, corner Cherry and Page Streets. James M. Lee, Secretary, Barker Street, Fremont, Ohio.

TORONTO

Meets fourth Monday of each month at Canadian Foresters' Hall, 22 College St., Room No. 2. Secretary, H. W. Graham, 102 Robina Ave., Toronto, Canada.

WATERBURY

Meets the second Friday of the month at Engineers Hall, No. 11 East Main Street. Wm. F. Guilfoile, secretary, P. O. Box 961, Waterbury, Conn.

WORCESTER

Meets Directors' Room, Chamber of Commerce, Worcester, Mass. Roger H. Bryant, Secretary, 94 Grove St., Worcester, Mass.